

# $e^+He^3$ Full Simulations

Alex Jentsch

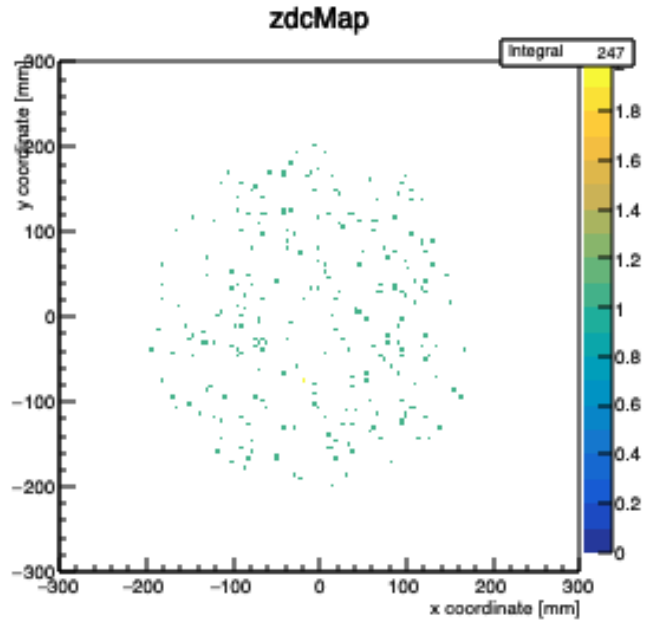
8/27/2020

# Preliminaries

- Everything shown here is *\*very\** new.
  - Just got MC files in the past 24 hours + needed to work out kinks in the code.
- Just looking at events with *\*active\** neutrons, and the two spectator protons – ignoring all other particles (for now), and ignoring charge exchange events (i.e. where the active neutron  $\rightarrow$  proton).
  - This is just to make life easier for now, and for a better comparison between Ivica's MC files and BeAGLE.
  - BeAGLE events have no INC.
  - Of course the other events can be included.
- All normal detectors included, but no smearing: acceptances only here.
- 5000 events each for the first look.

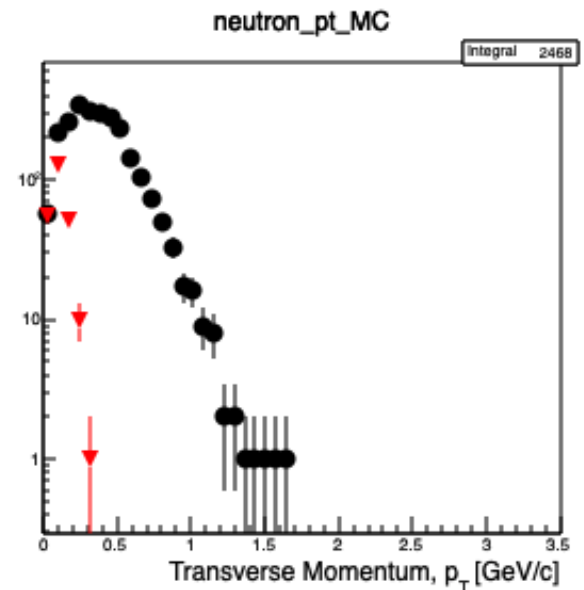
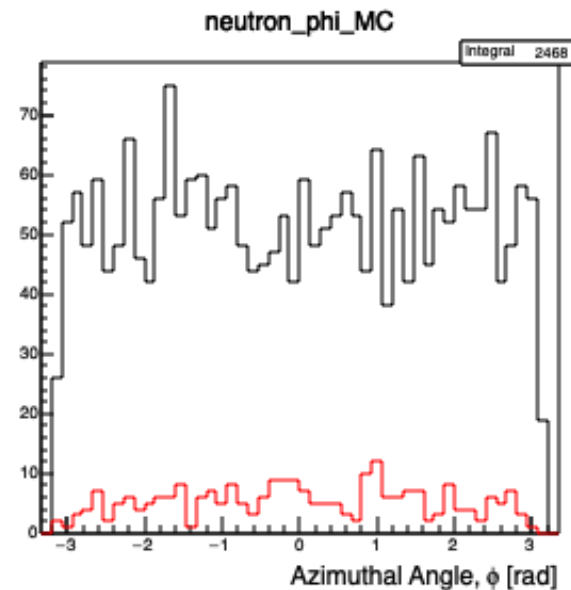
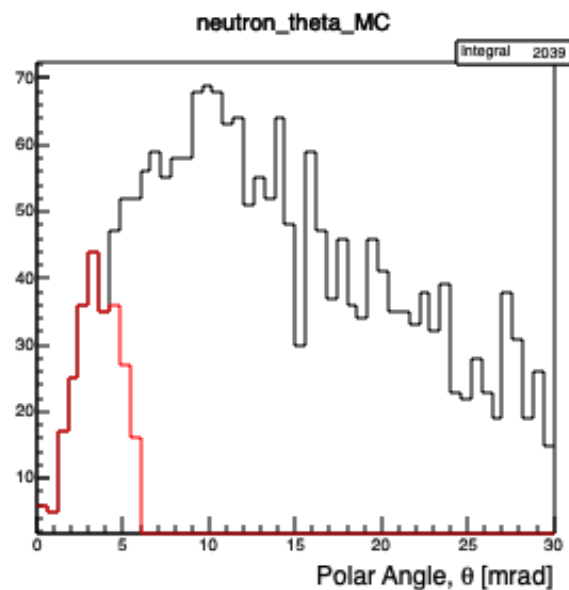
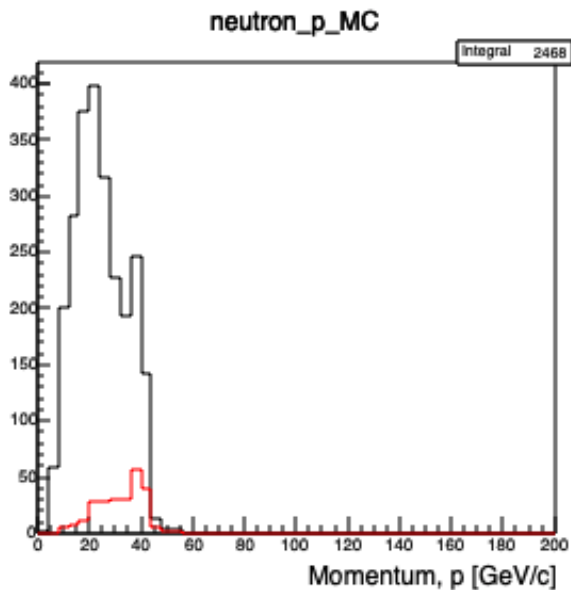
BeAGLE 5x41 GeV/n DIS

# BeAGLE 5x41 results – active neutrons – DIS

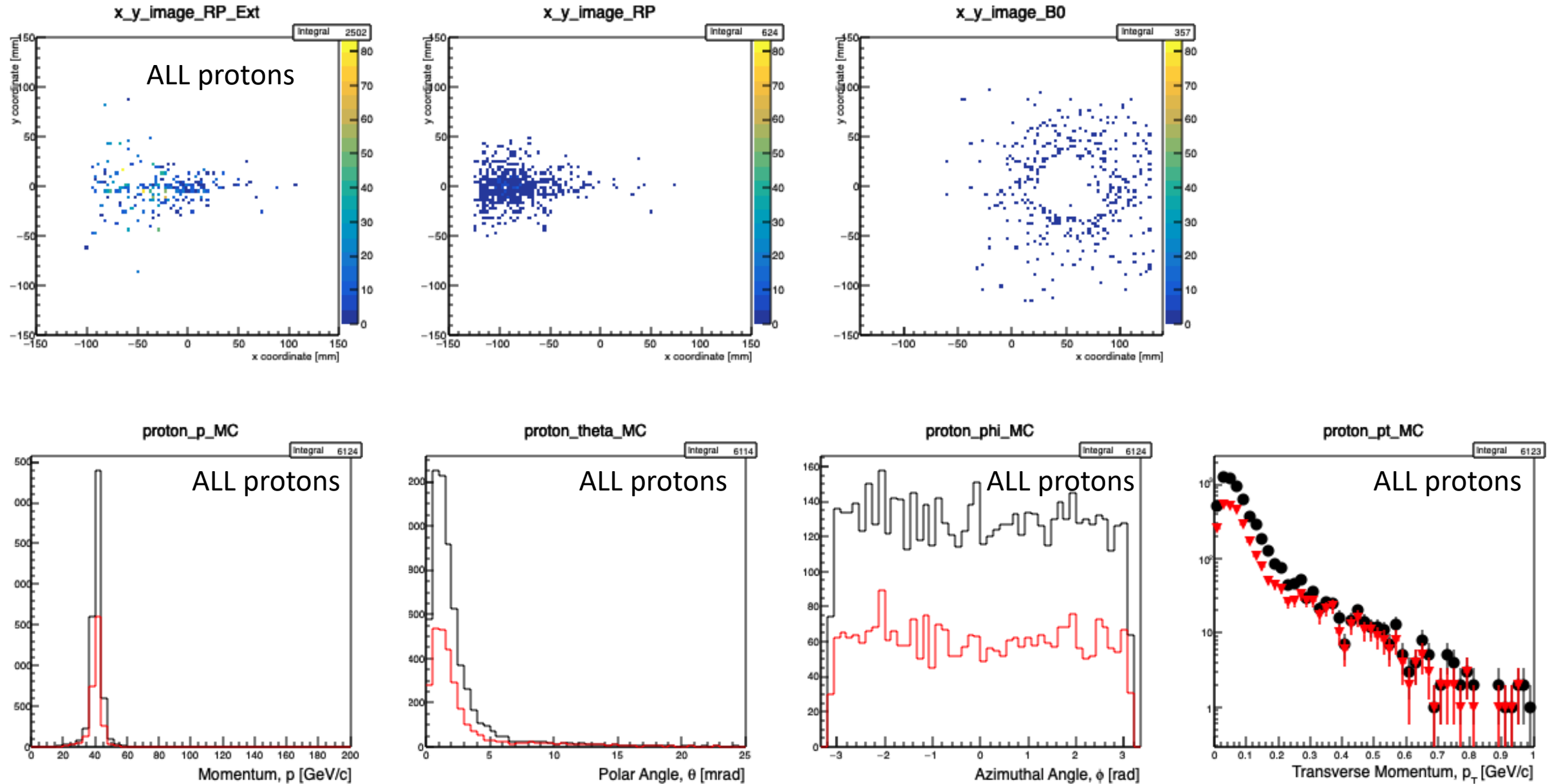


Pretty much as expected. Active neutrons are hard to tag in the FF region since they usually fall outside the 4.5 mrad cone.

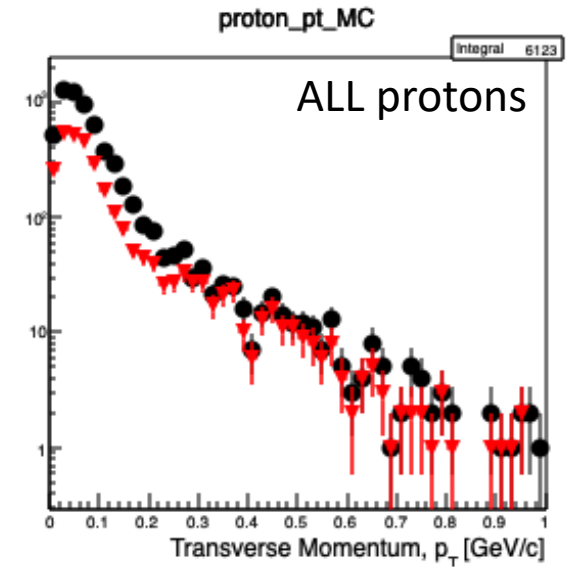
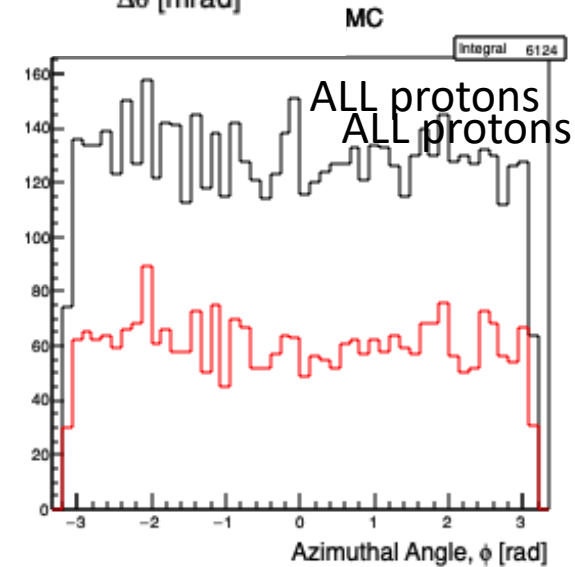
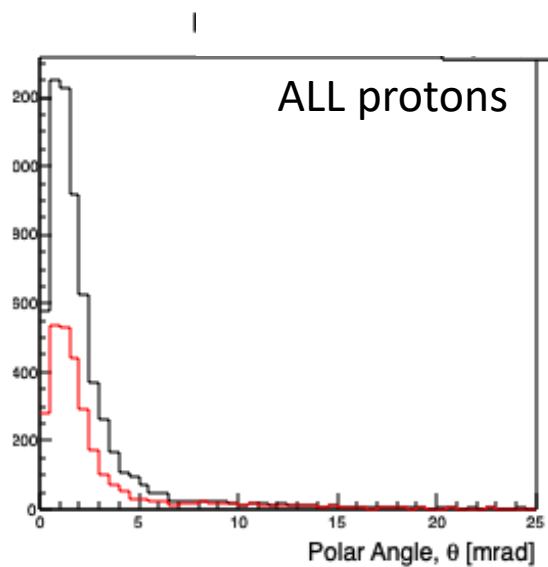
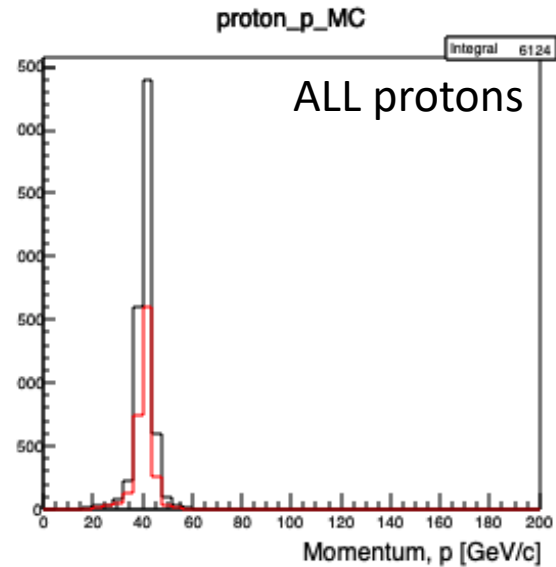
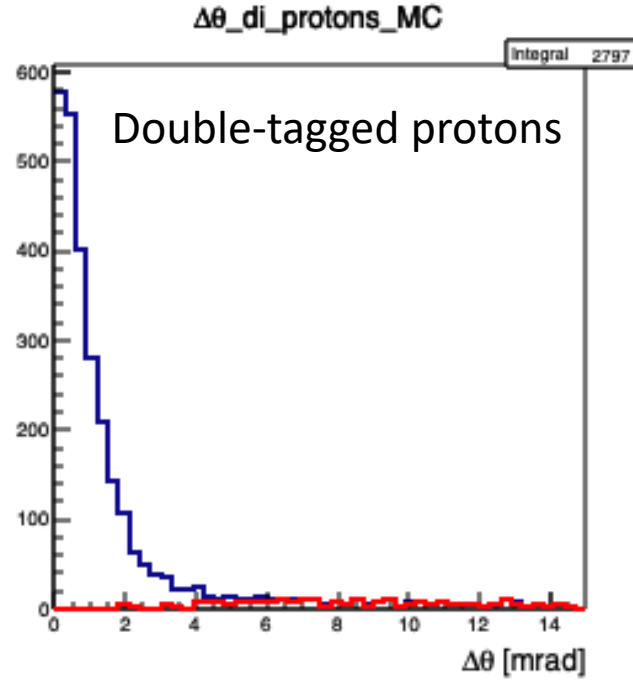
However, some will fall into the main detector acceptance ( $> 35$  mrad).



# BeAGLE 5x41 results – spectator protons – DIS

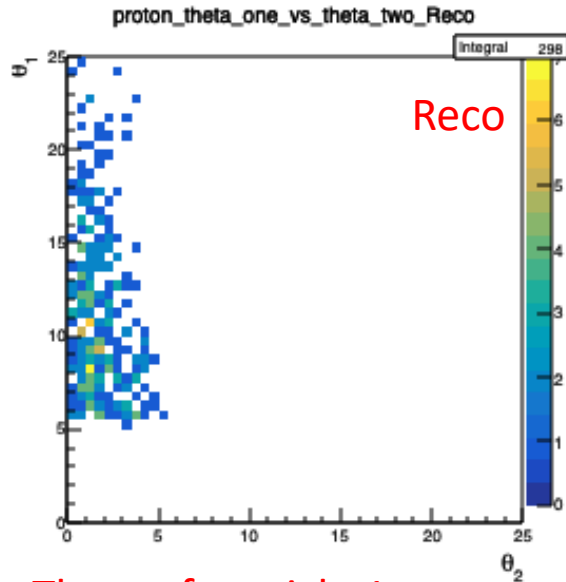
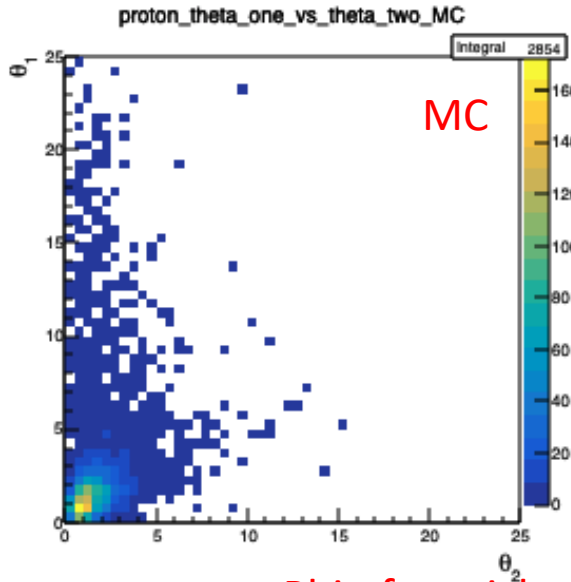


# BeAGLE 5x41 results – spectator protons – DIS

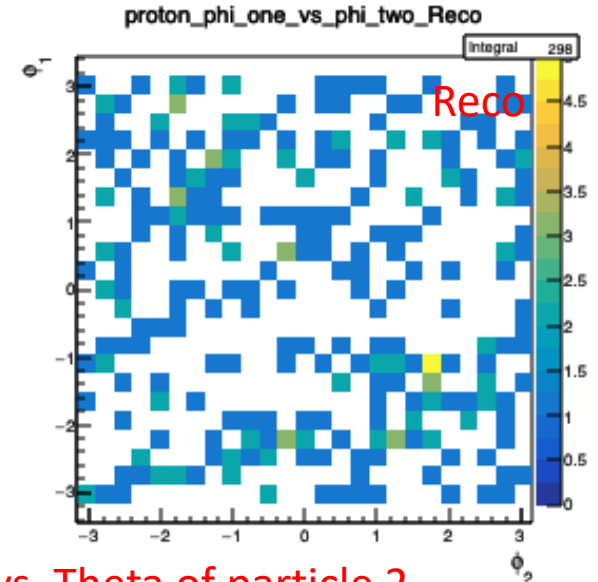
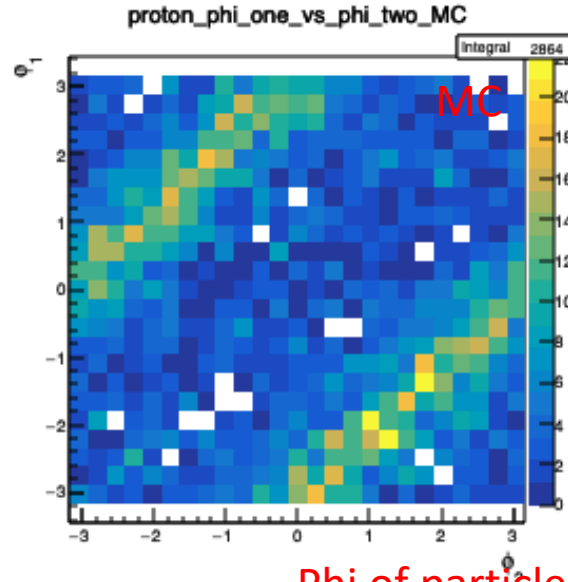


# BeAGLE 5x41 results – spectator protons – DIS

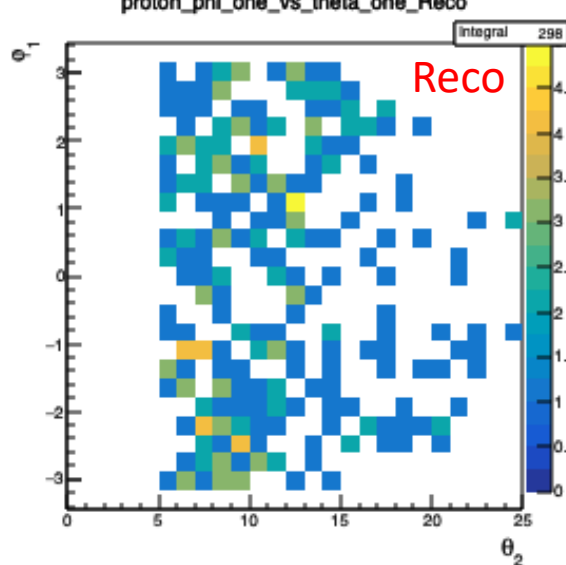
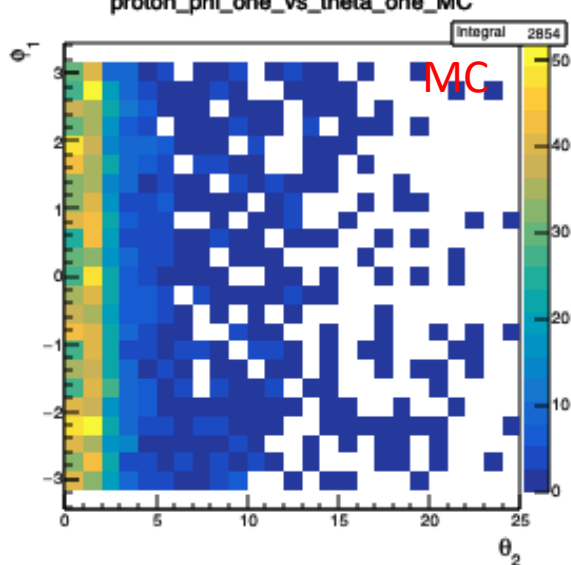
Theta of particle 1 vs. Theta of particle 2



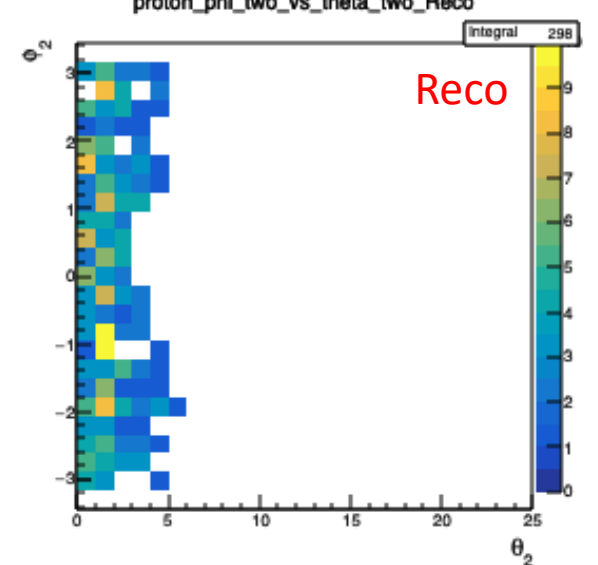
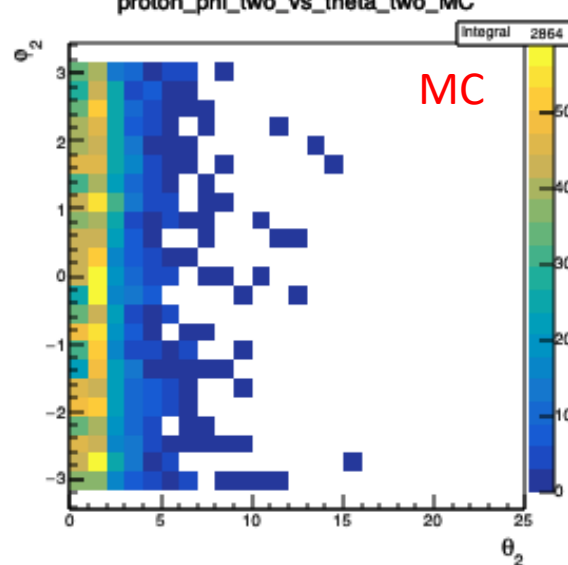
Phi of particle 1 vs. Phi of particle 2



Phi of particle 1 vs. Theta of particle 1



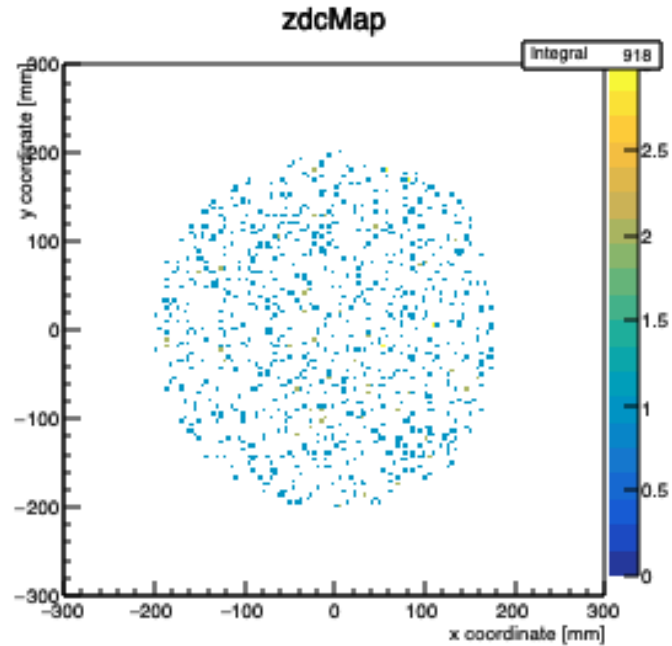
Phi of particle 2 vs. Theta of particle 2



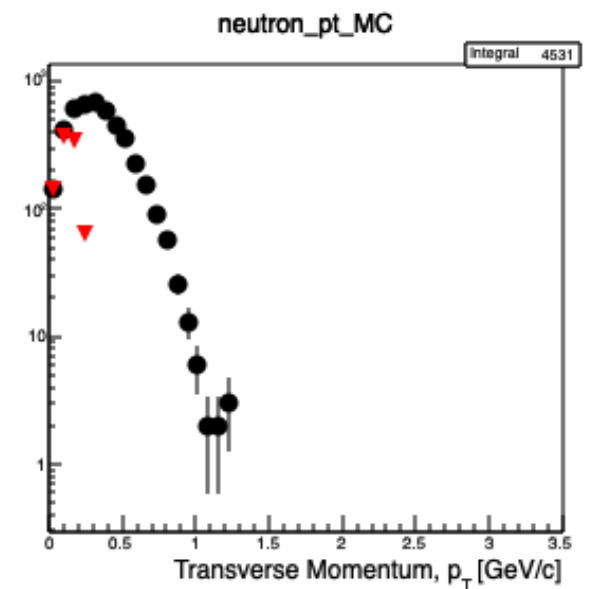
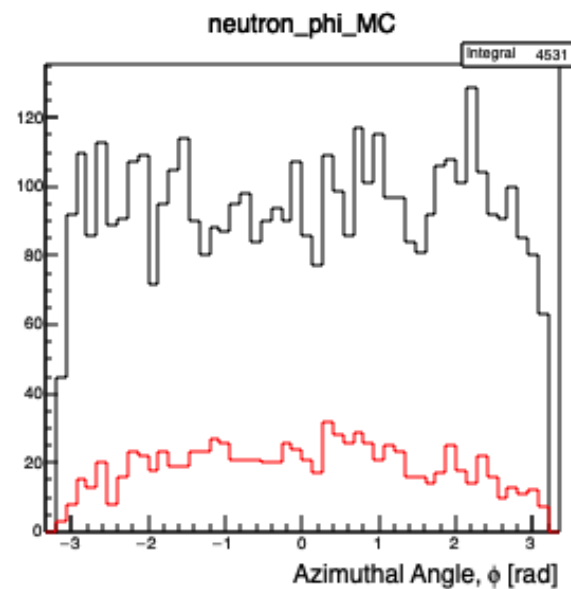
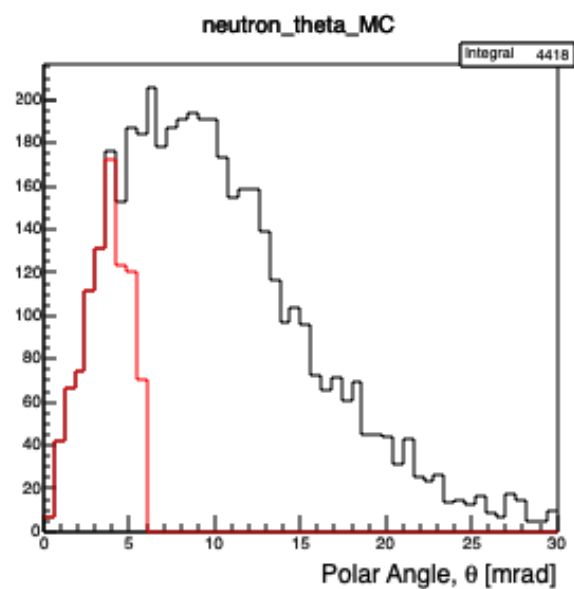
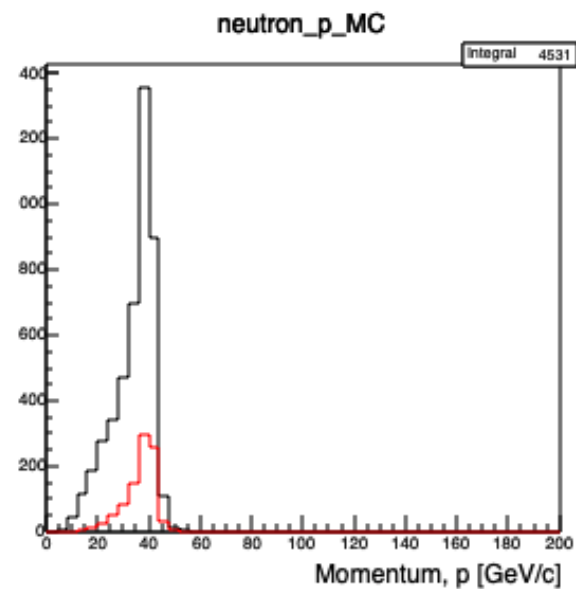
BeAGLE 5x41 GeV/n J/Psi



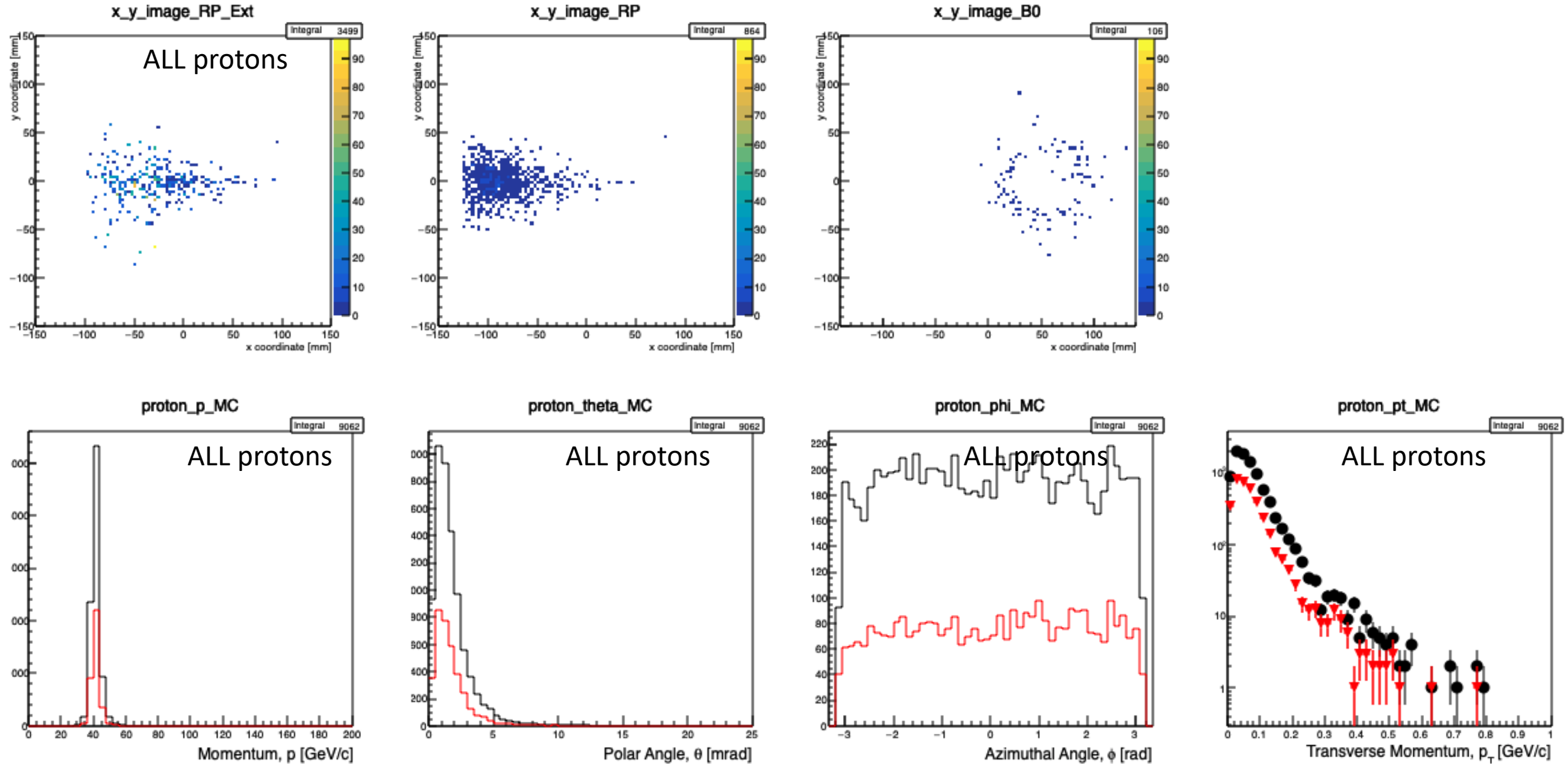
# BeAGLE 5x41 results – active neutrons – J/Psi



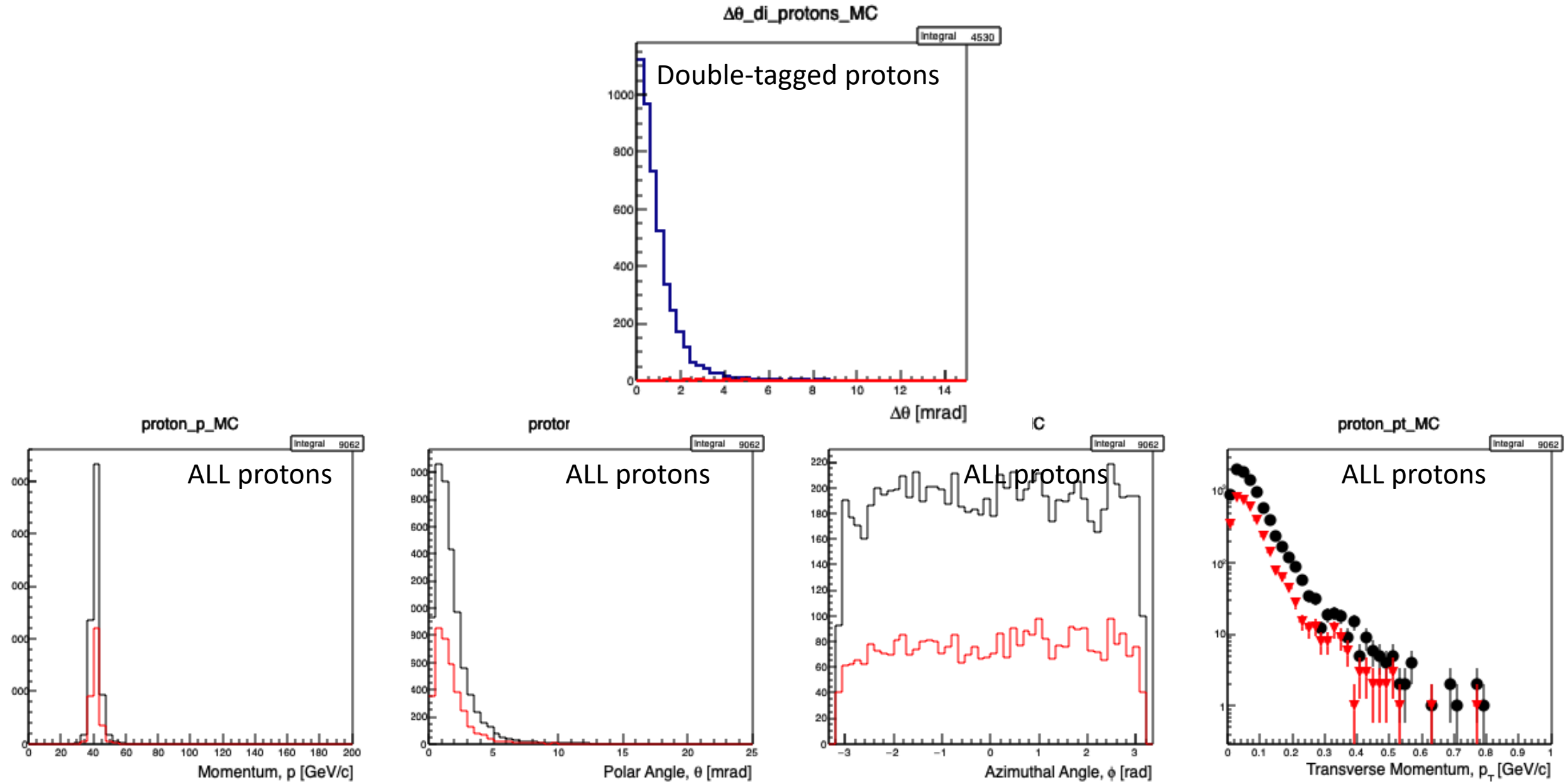
A little better than in the DIS case.



# BeAGLE 5x41 results – spectator protons – J/Psi



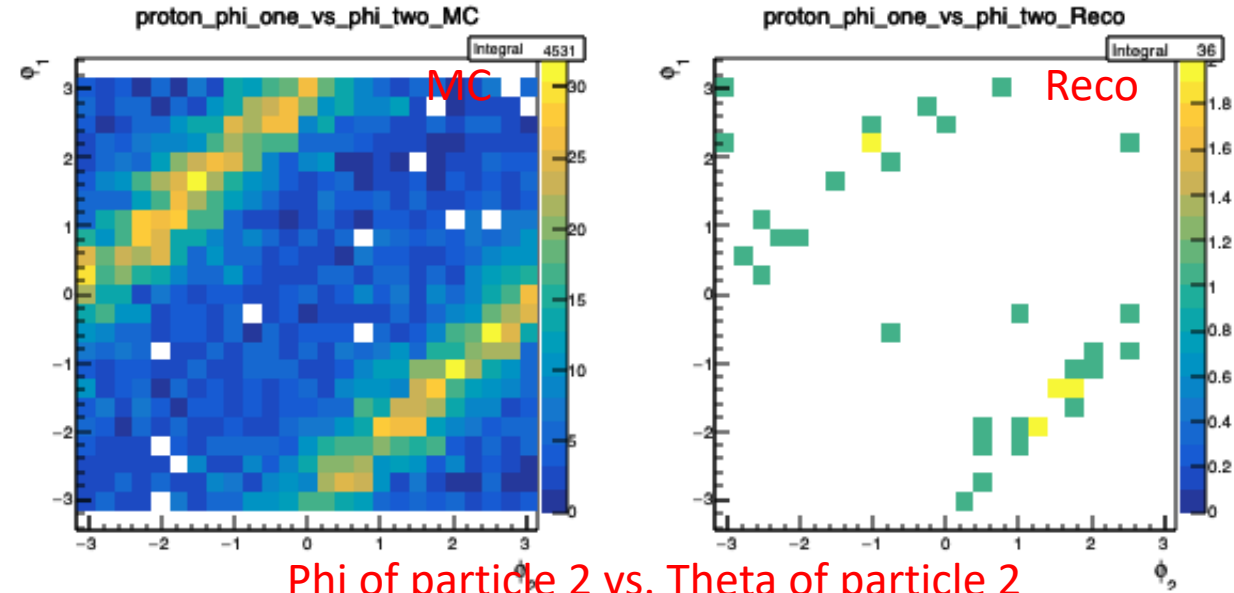
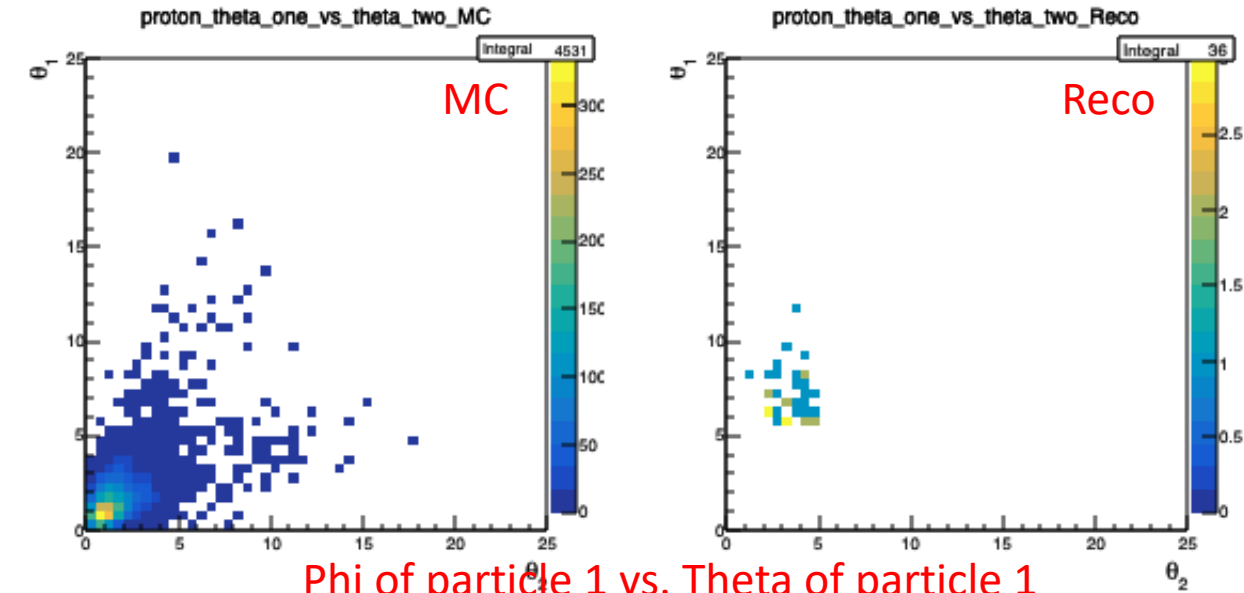
# BeAGLE 5x41 results – spectator protons – J/Psi



# BeAGLE 5x41 results – spectator protons – J/Psi

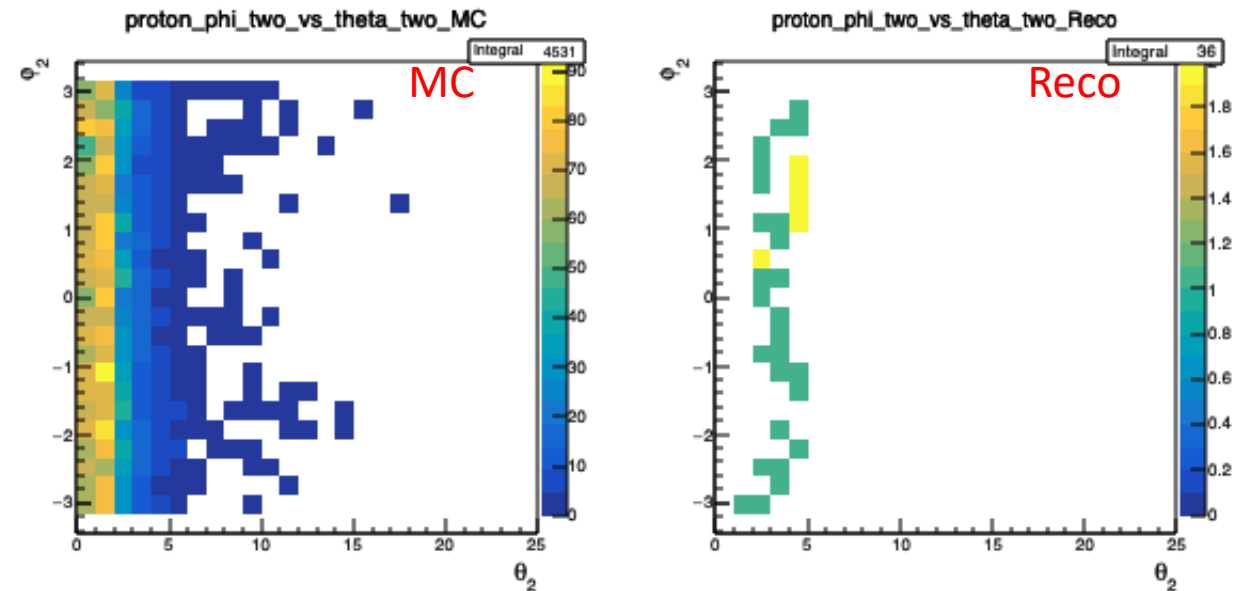
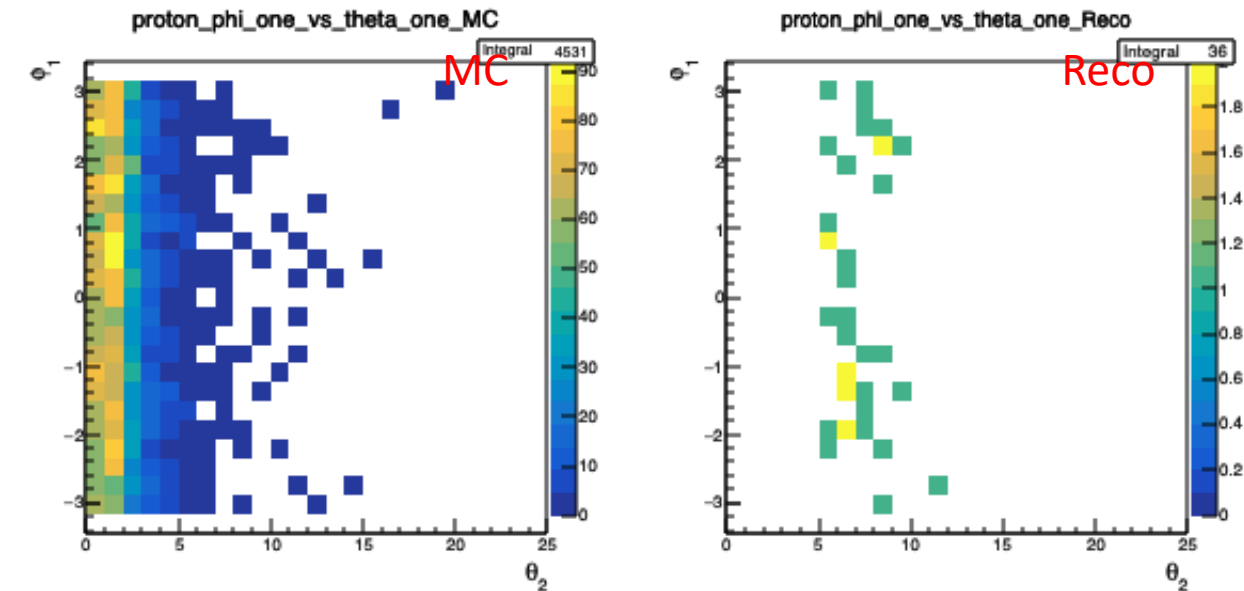
Theta of particle 1 vs. Theta of particle 2

Phi of particle 1 vs. Phi of particle 2



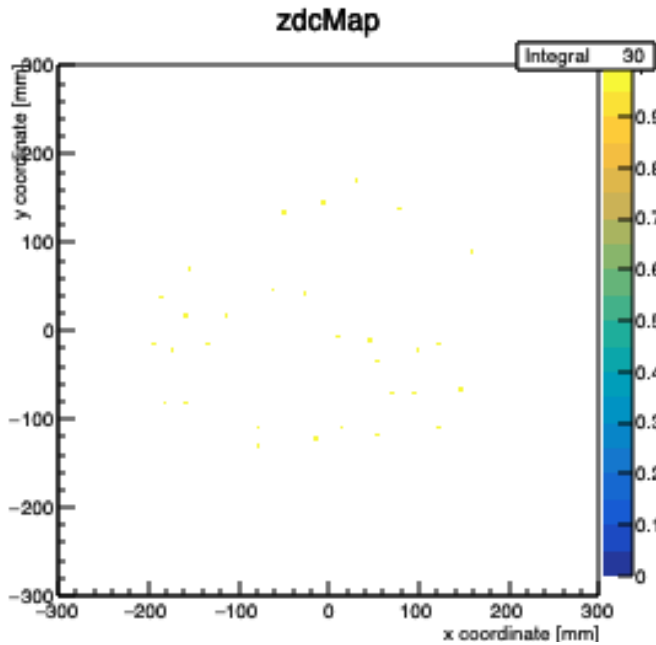
Phi of particle 1 vs. Theta of particle 1

Phi of particle 2 vs. Theta of particle 2

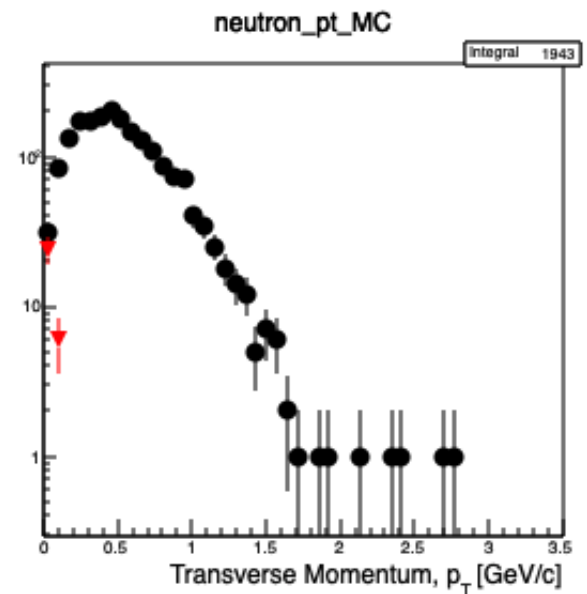
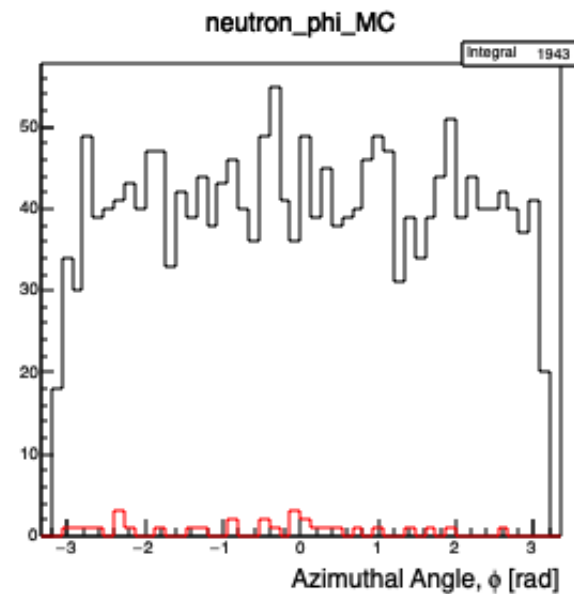
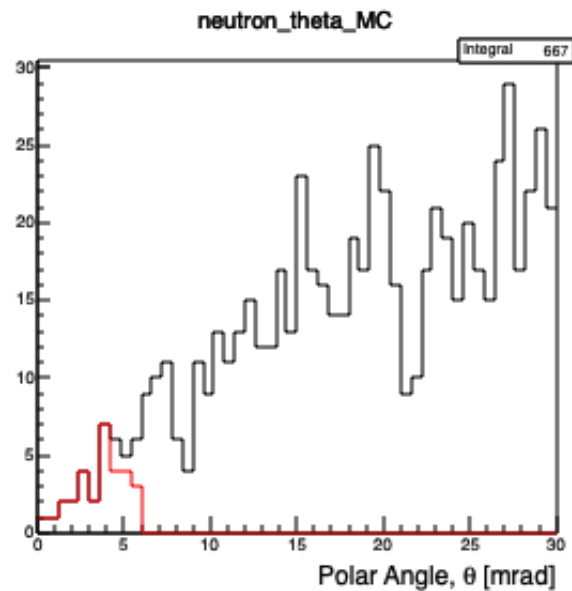
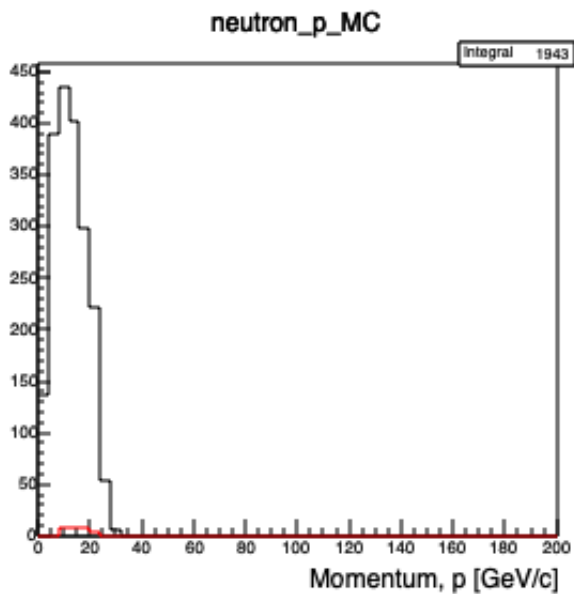


Ivica 5x41 GeV/n SRC

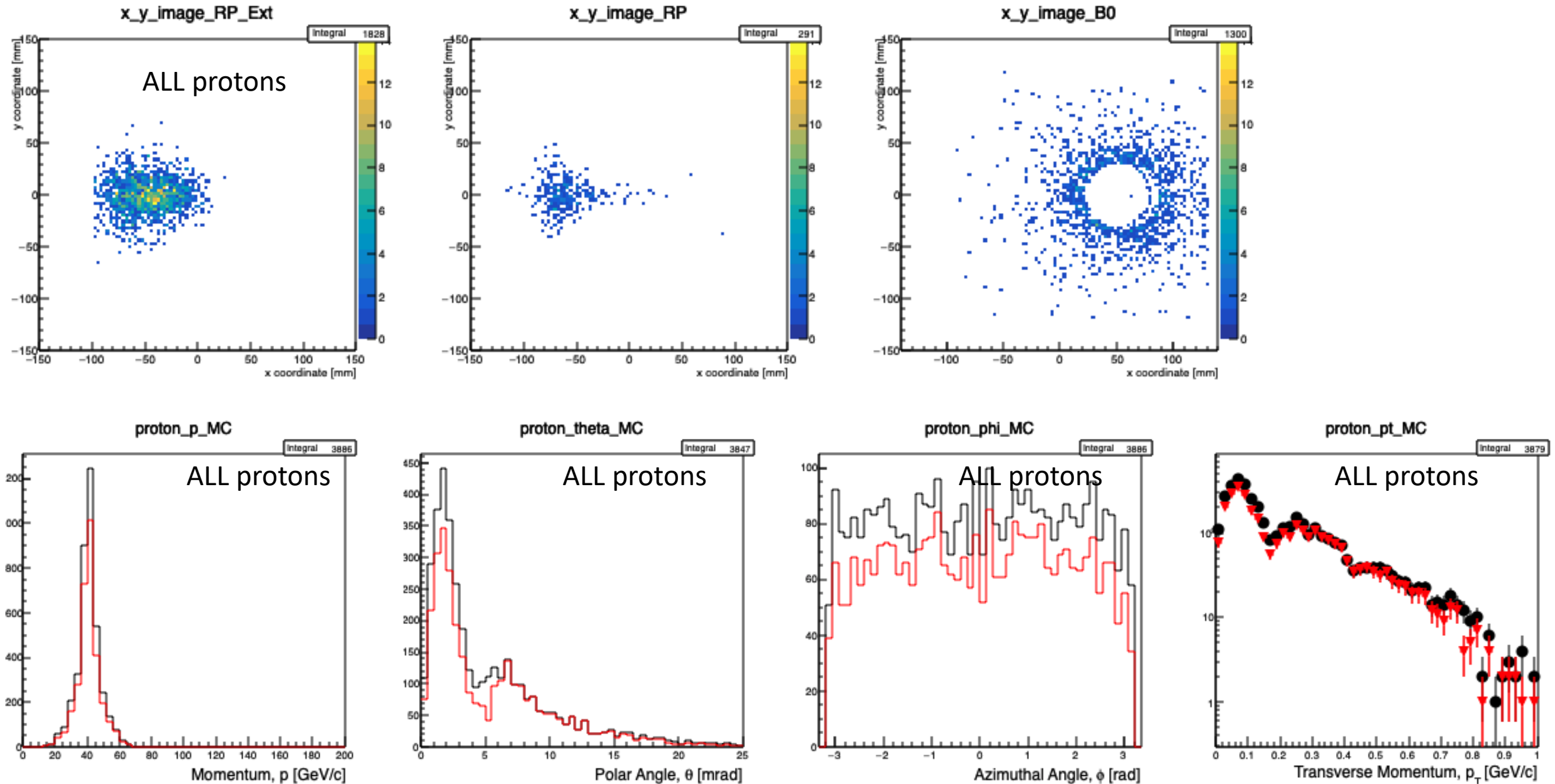
# Ivica 5x41 results – active neutrons – SRC



Pretty much nothing (color scheme hides the tiny number of hits).

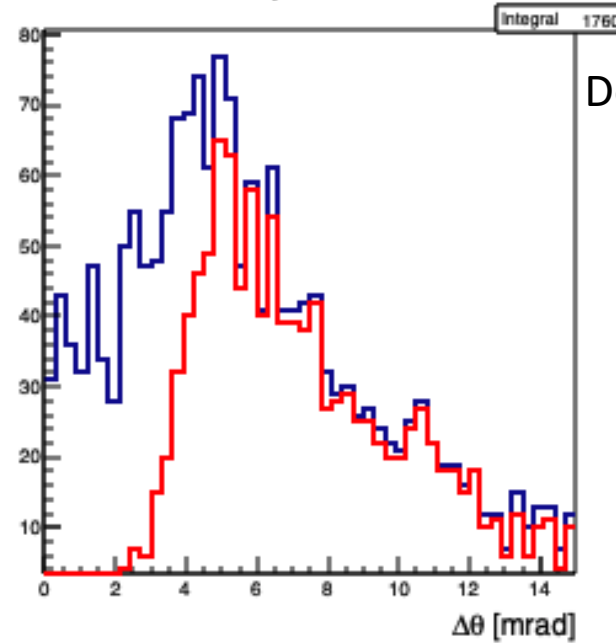


# Ivica 5x41 results – spectator protons – SRC



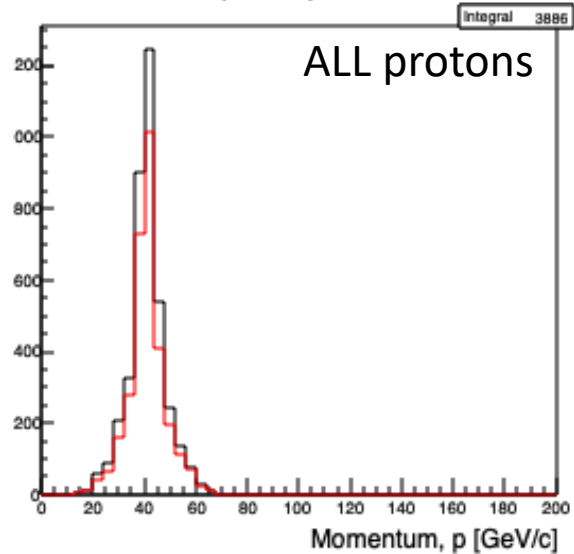
# Ivica 5x41 results – spectator protons – SRC

$\Delta\theta_{di\_protons\_MC}$



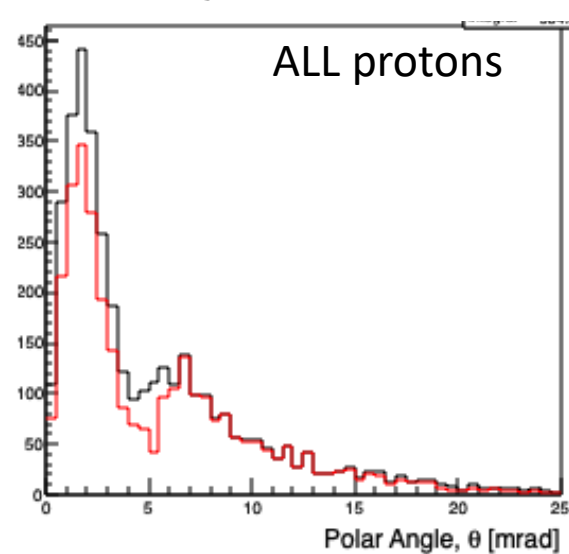
Double-tagged protons

proton\_p\_MC



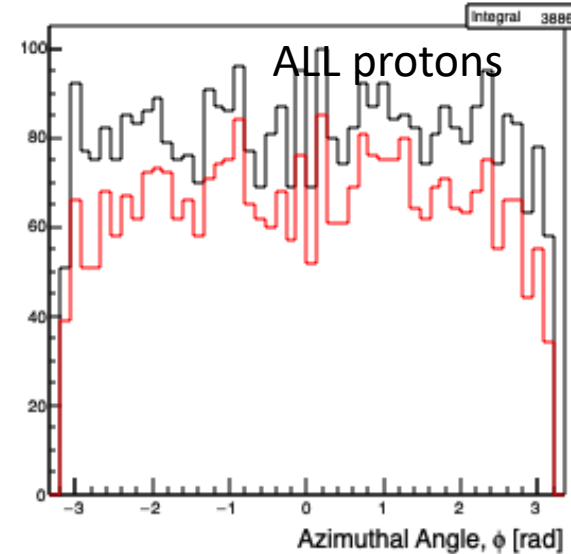
ALL protons

proton\_theta\_l



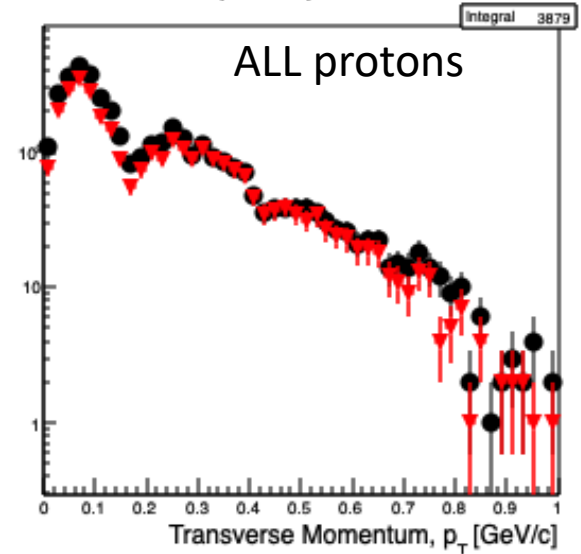
ALL protons

proton\_theta\_l



ALL protons

proton\_pt\_MC

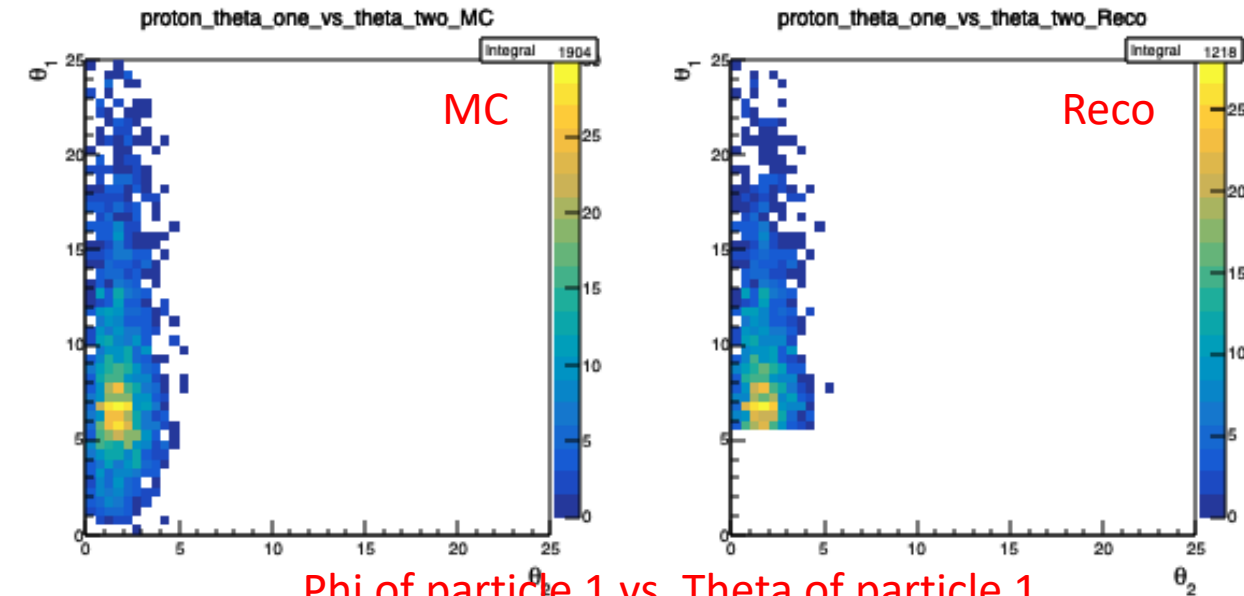


ALL protons

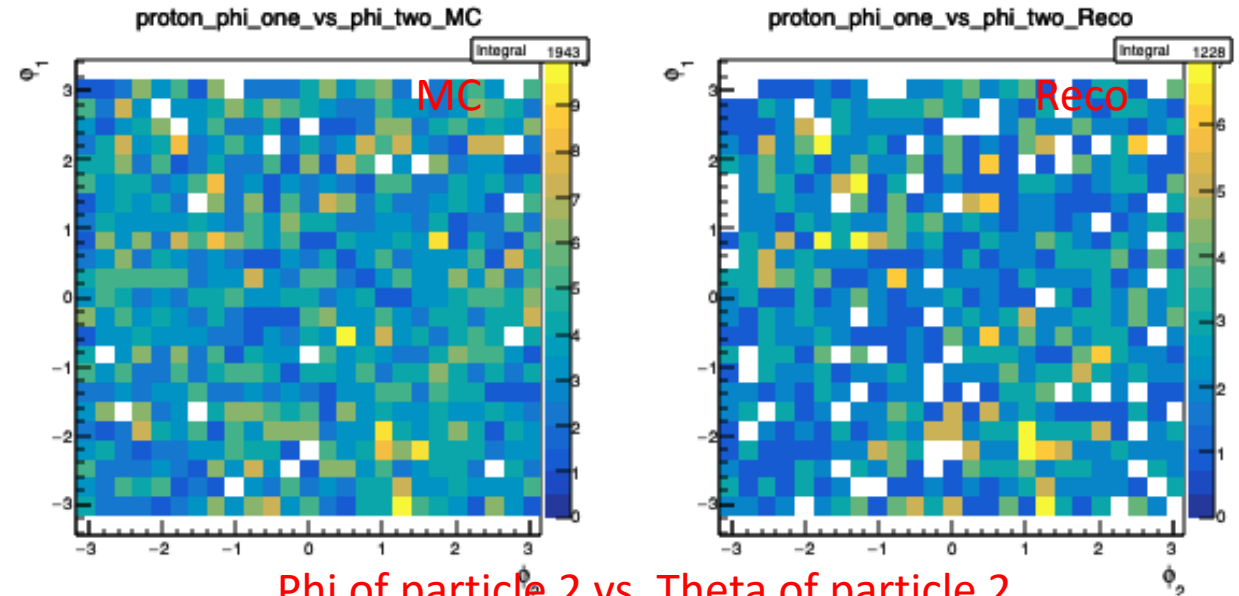


# Ivica 5x41 results – spectator protons – SRC

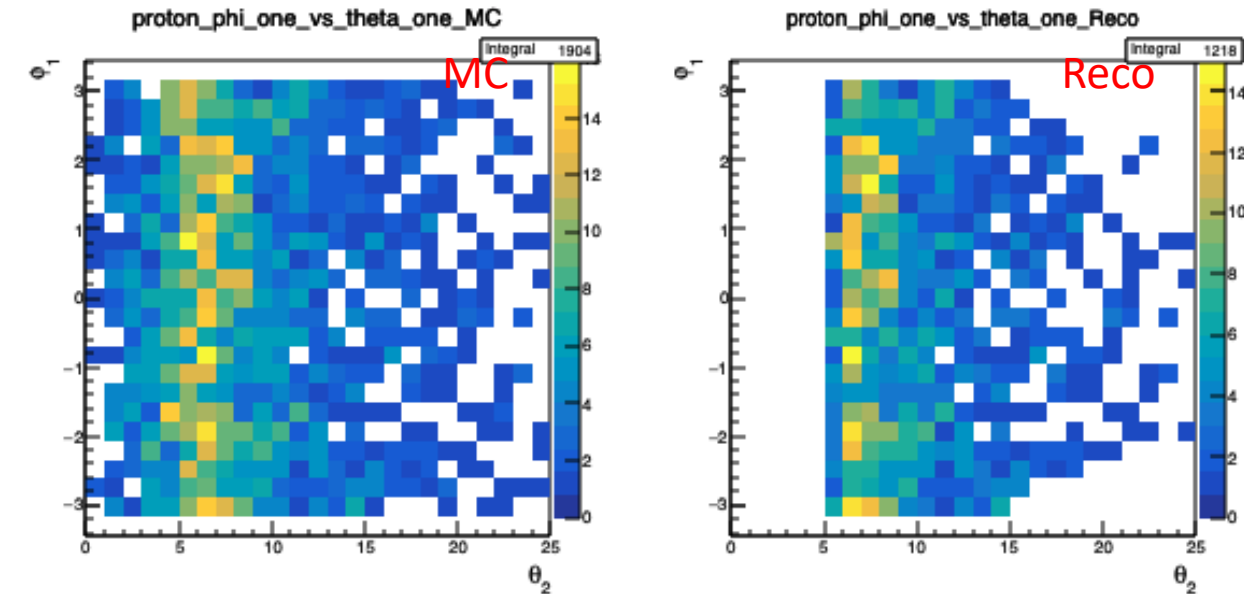
Theta of particle 1 vs. Theta of particle 2



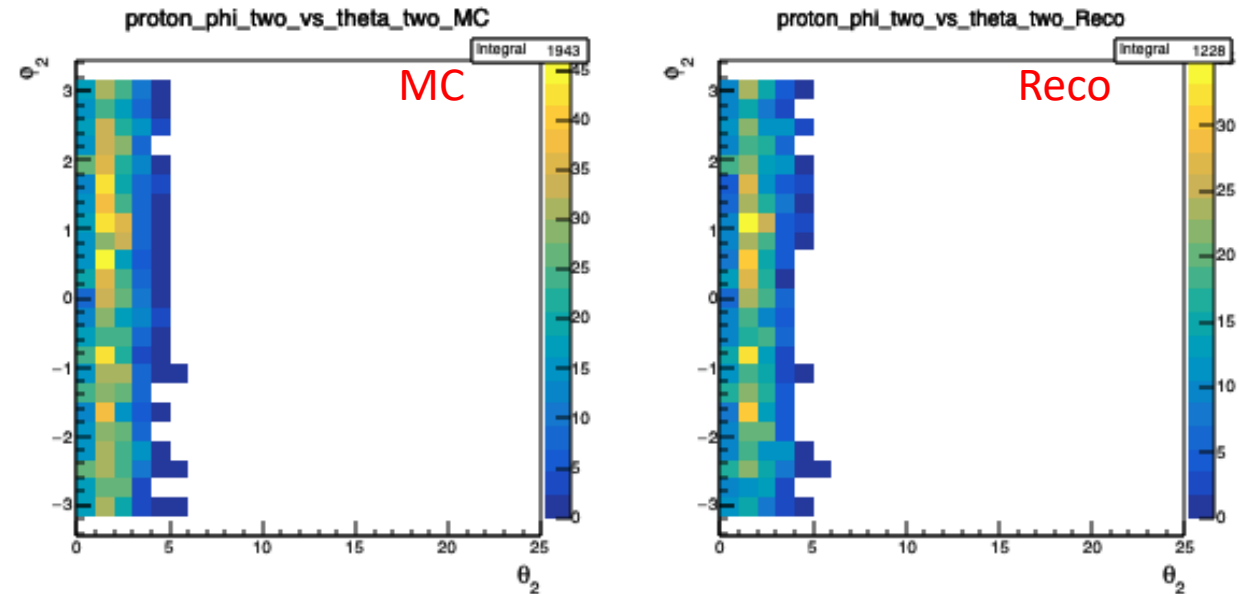
Phi of particle 1 vs. Phi of particle 2



Phi of particle 1 vs. Theta of particle 1

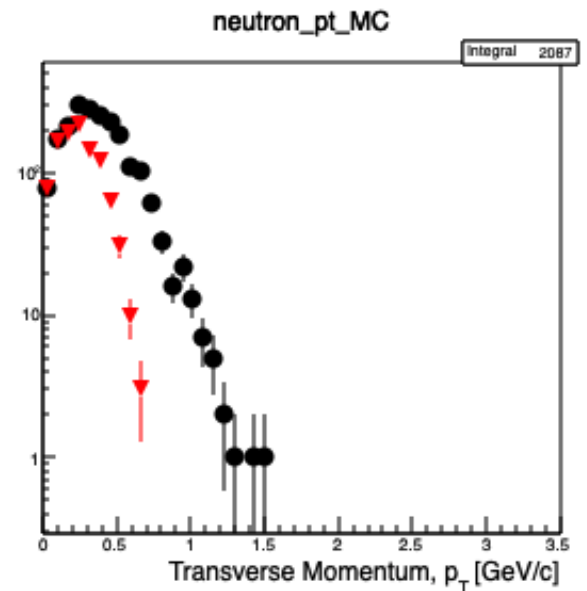
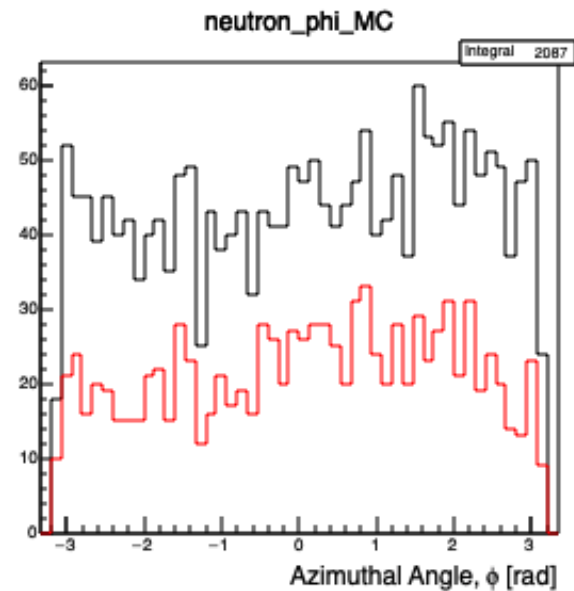
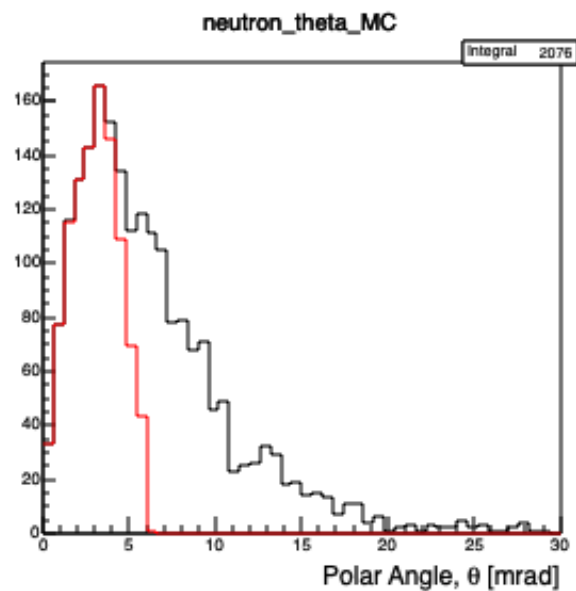
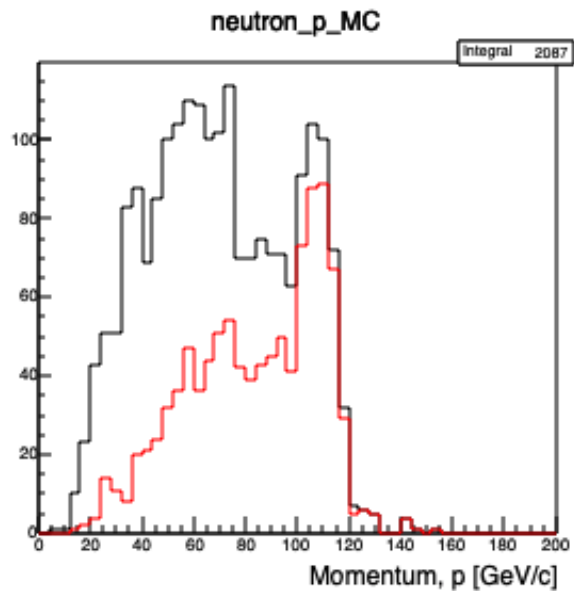
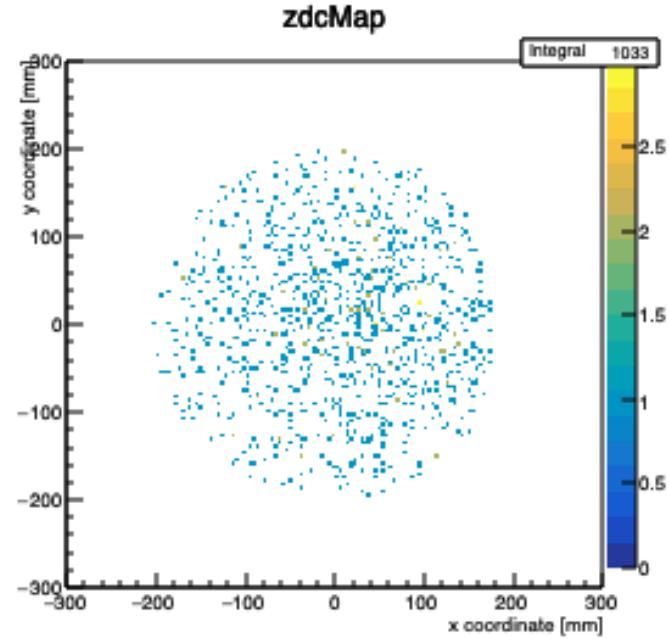


Phi of particle 2 vs. Theta of particle 2

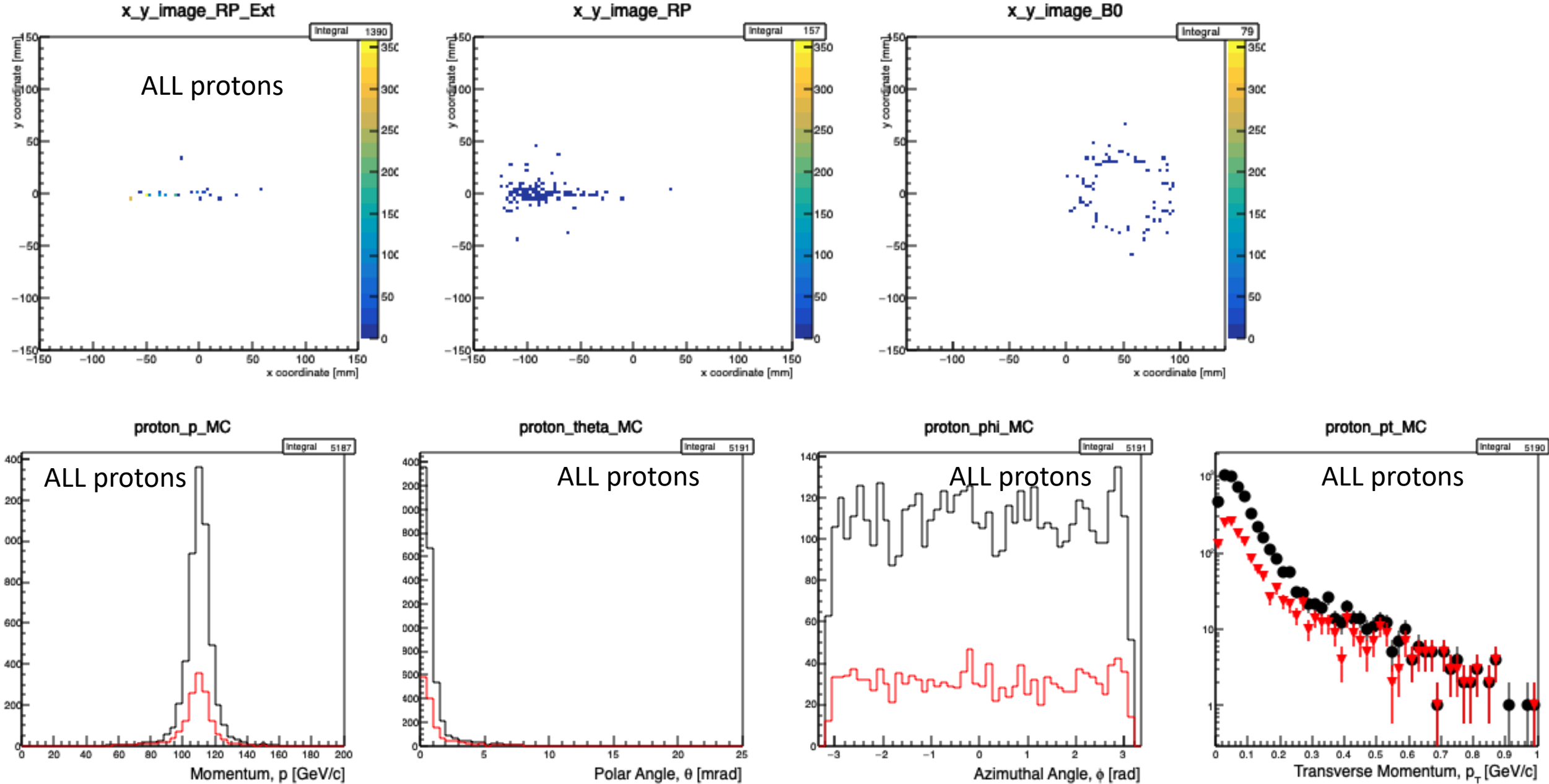


BeAGLE 18x110 GeV/n DIS

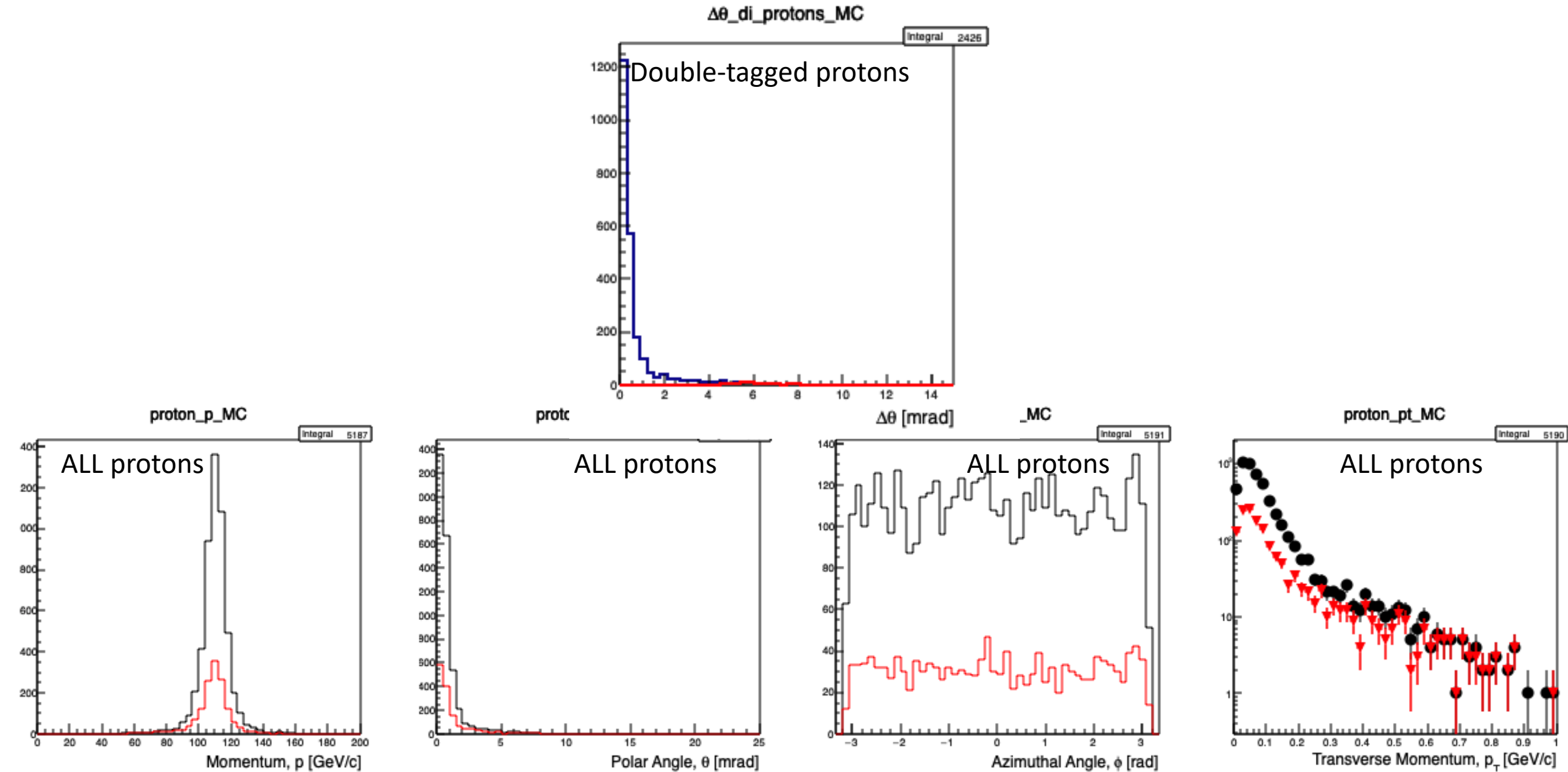
# BeAGLE 18x110 results – active neutrons – DIS



# BeAGLE 18x110 results – spectator protons – DIS

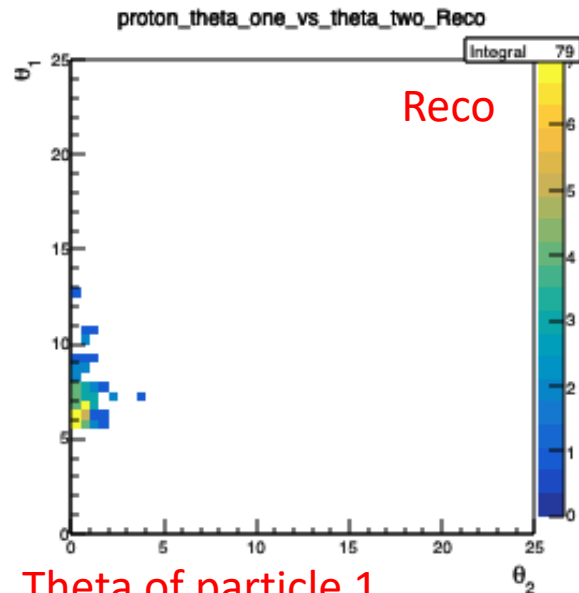
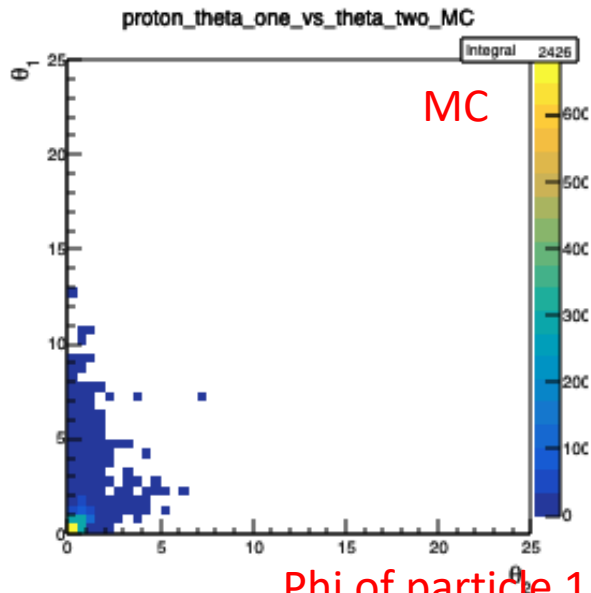


# BeAGLE 18x110 results – spectator protons – DIS

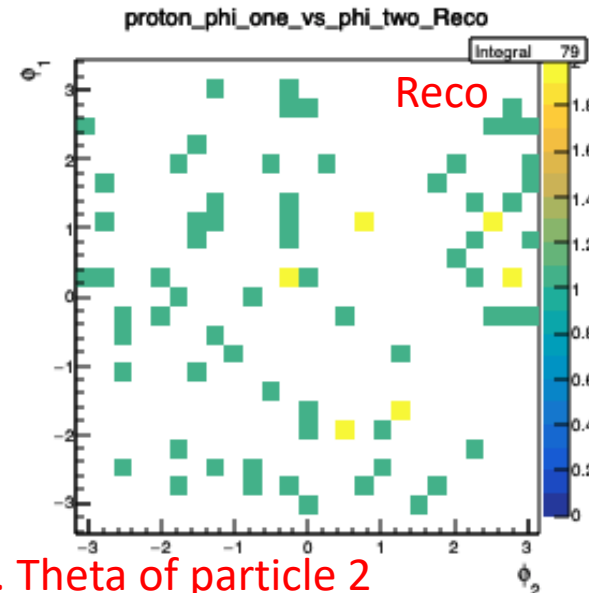
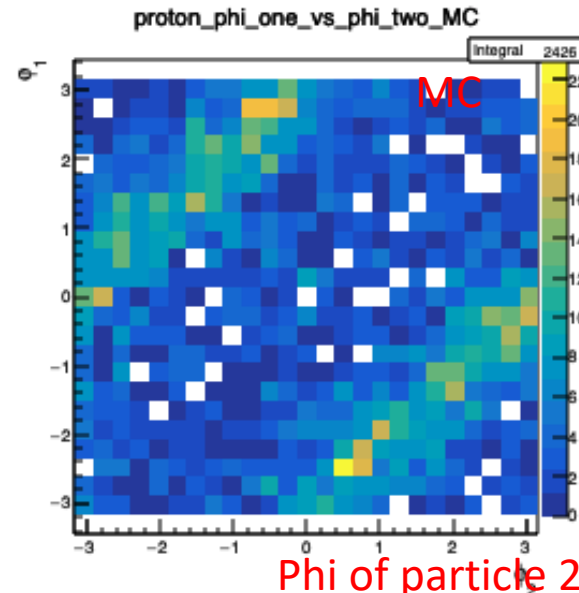


# BeAGLE 18x110 results – spectator protons – DIS

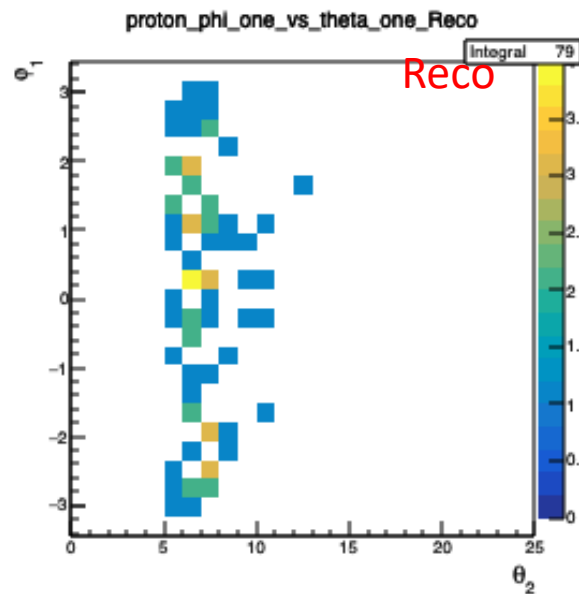
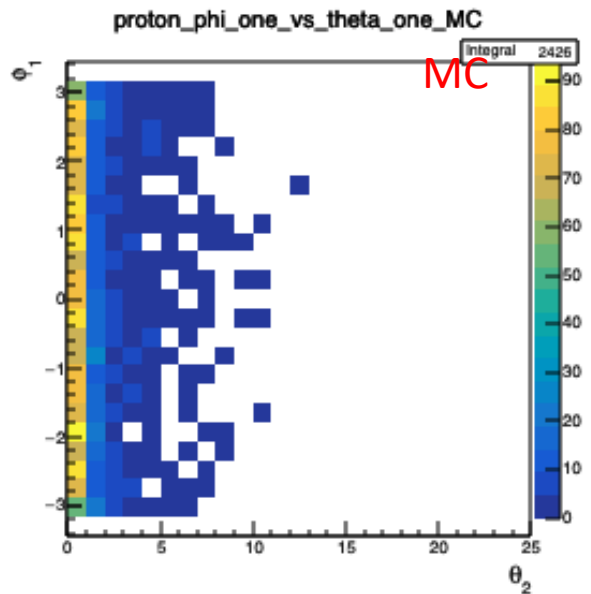
Theta of particle 1 vs. Theta of particle 2



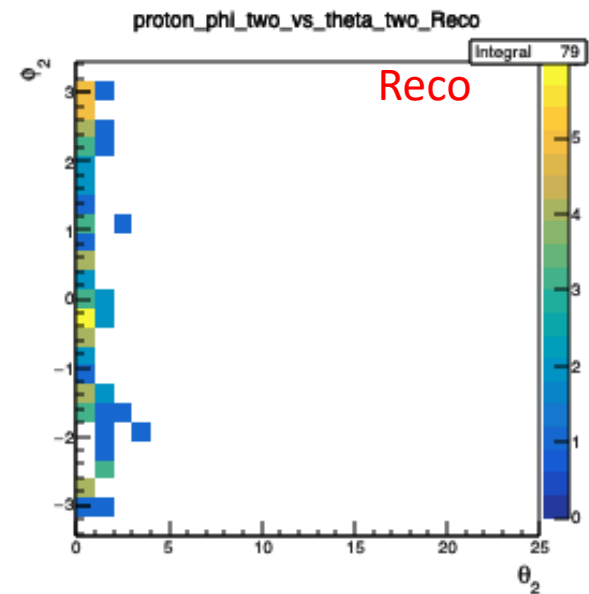
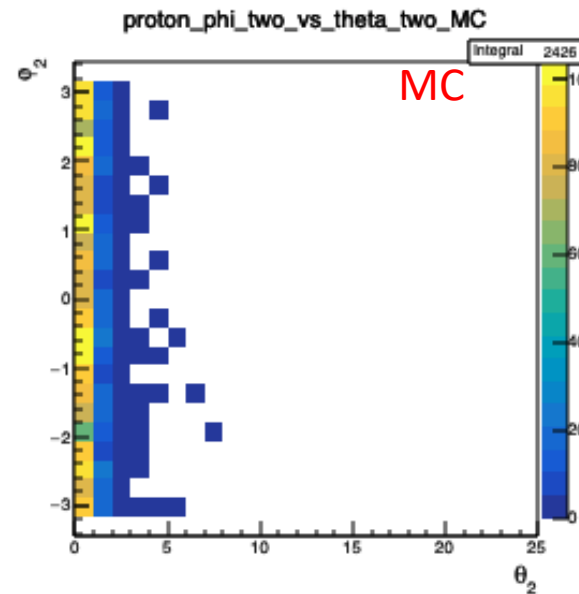
Phi of particle 1 vs. Phi of particle 2



Phi of particle 1 vs. Theta of particle 1



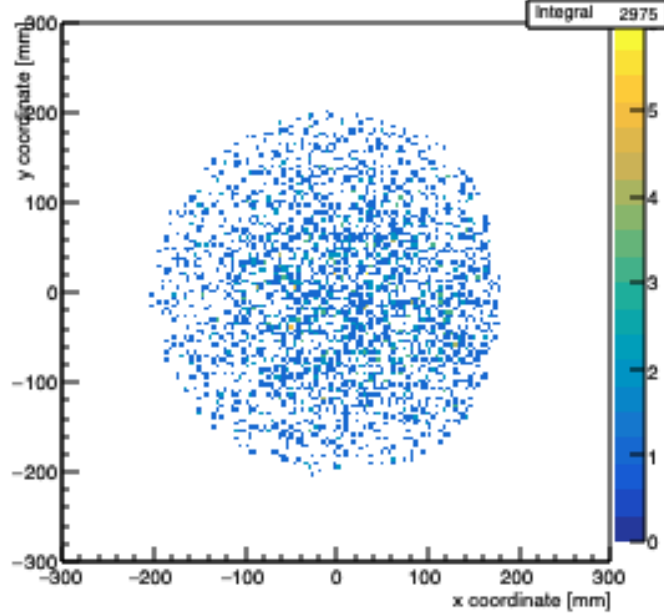
Phi of particle 2 vs. Theta of particle 2



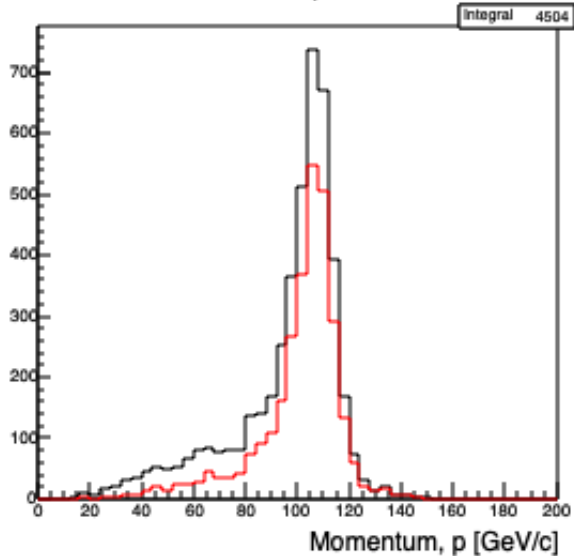
BeAGLE 18x110 GeV/n JPsi

# BeAGLE 18x110 results – active neutrons – JPsi

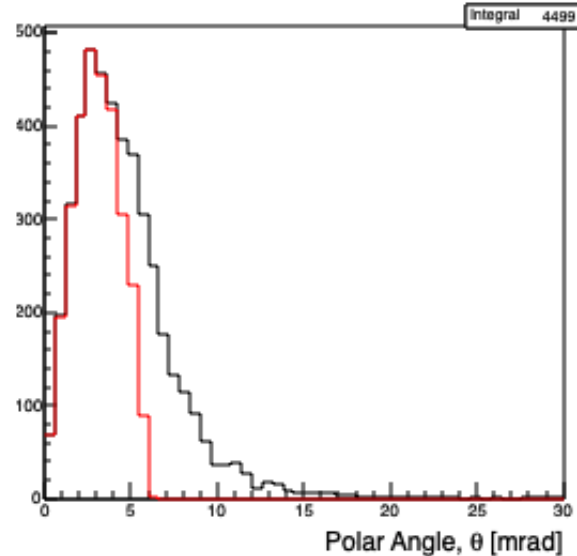
zdcMap



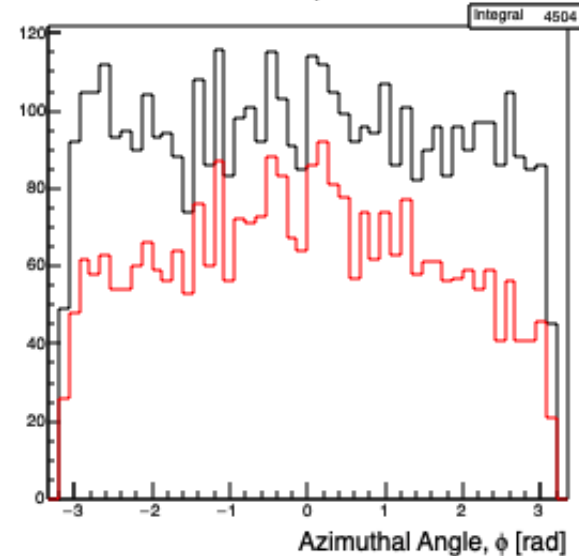
neutron\_p\_MC



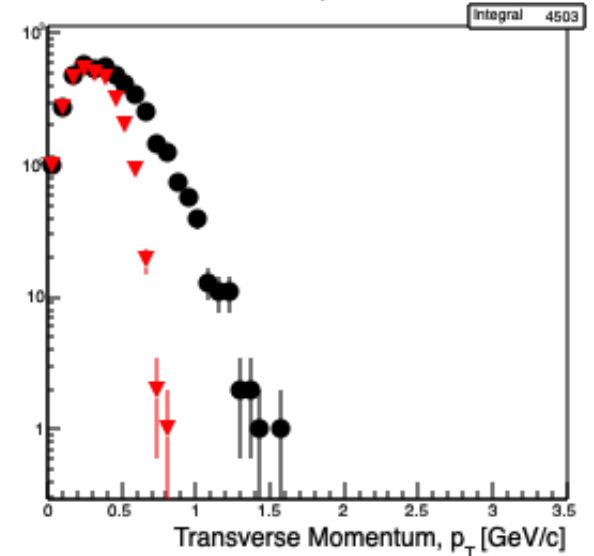
neutron\_theta\_MC



neutron\_phi\_MC

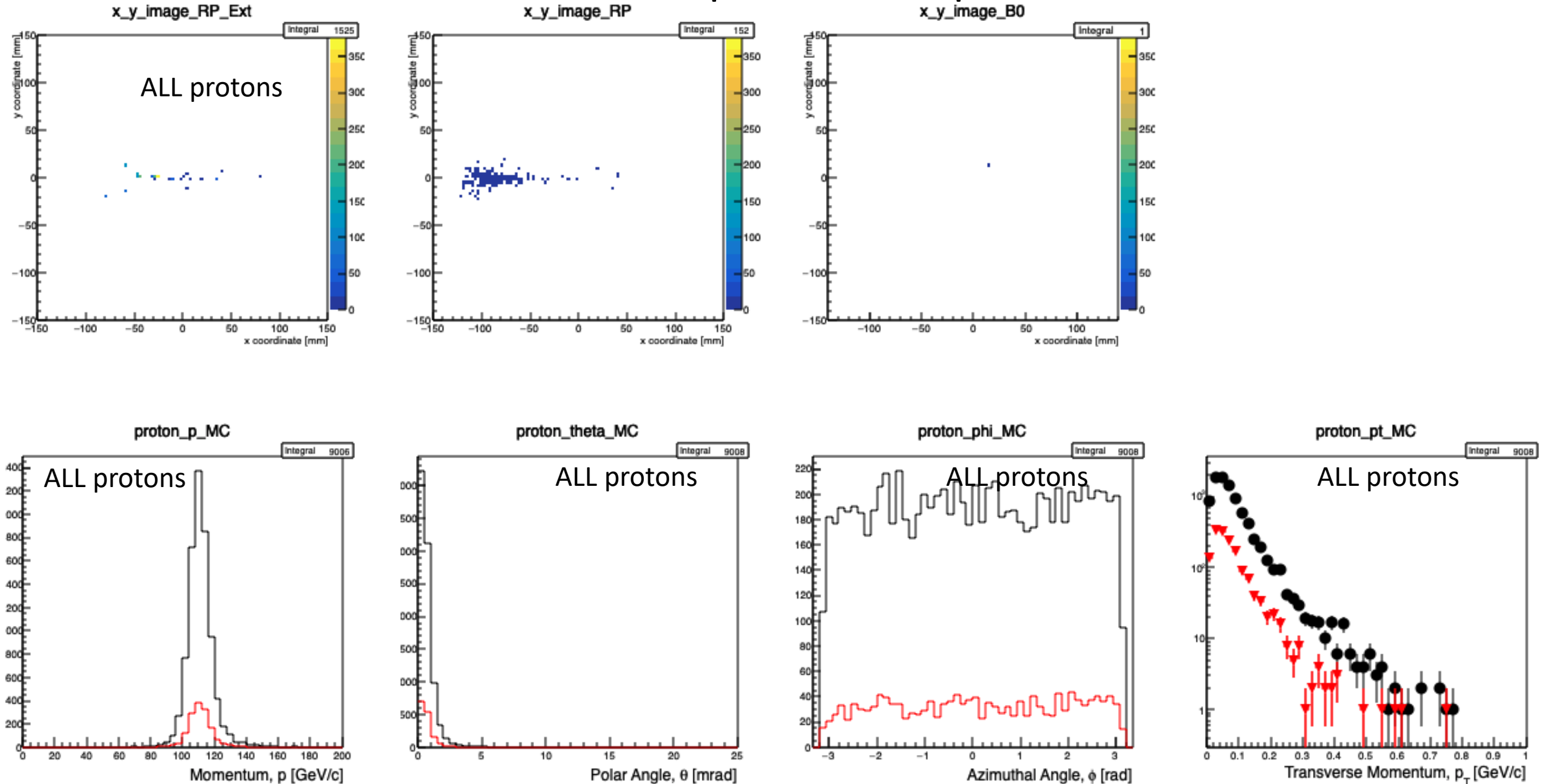


neutron\_pt\_MC

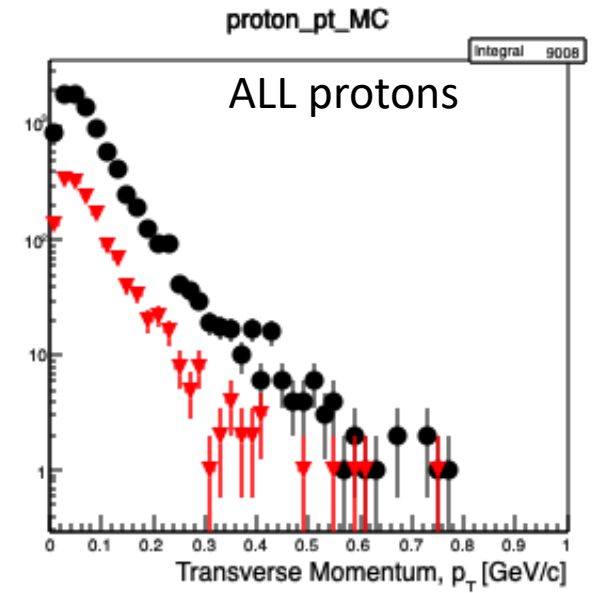
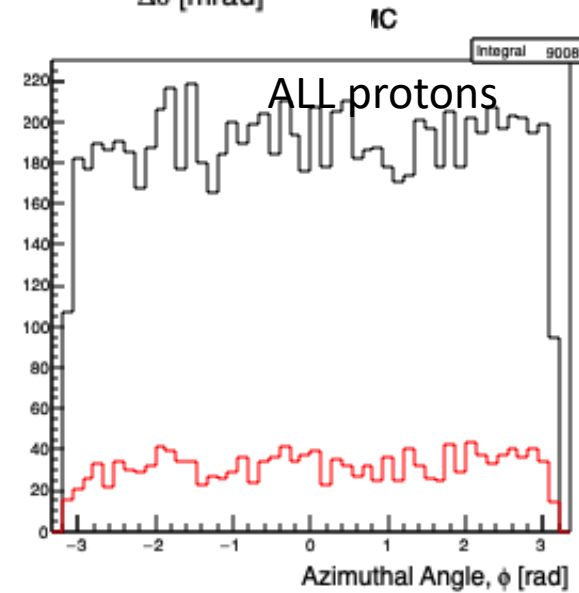
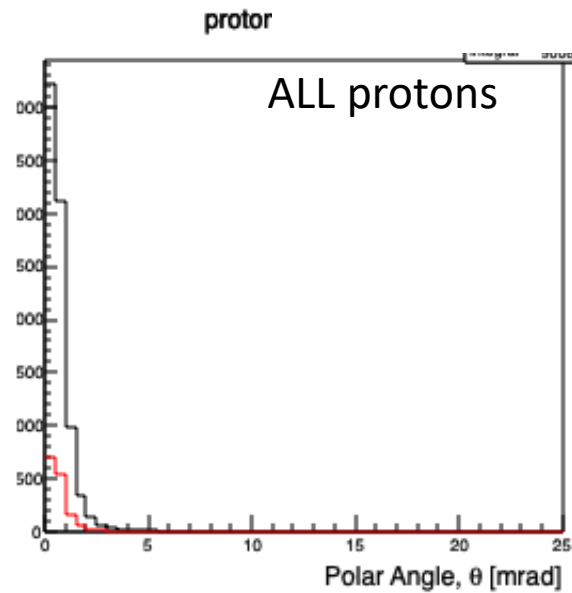
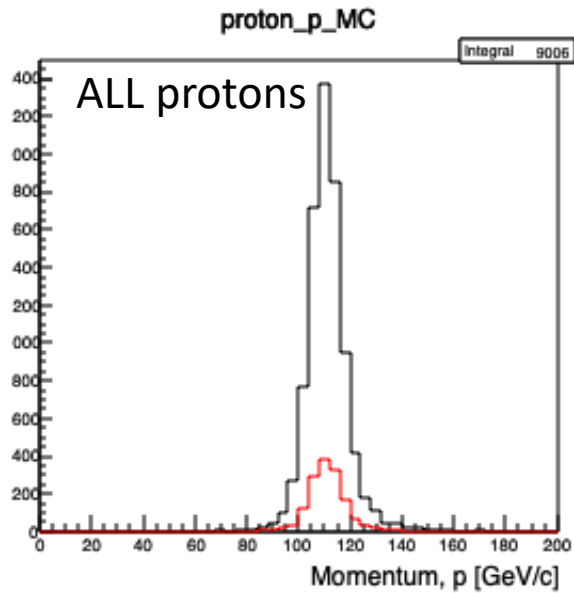
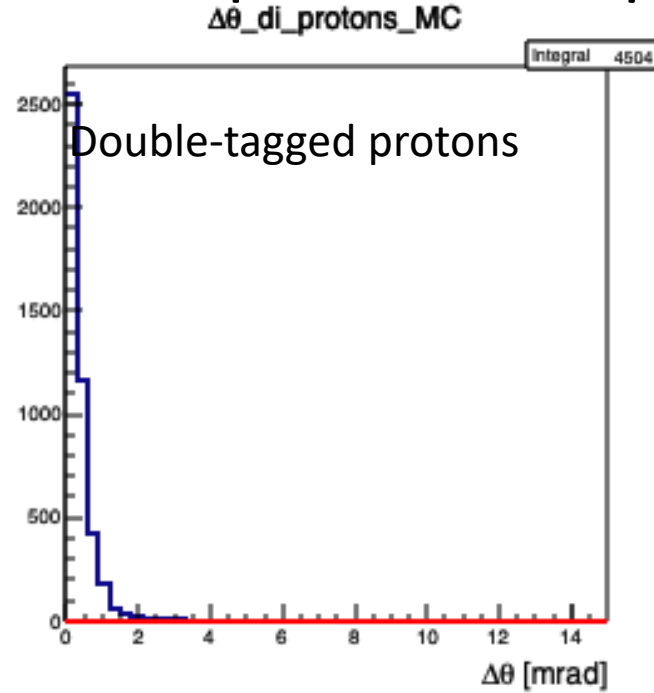




# BeAGLE 18x110 results – spectator protons – JPsi



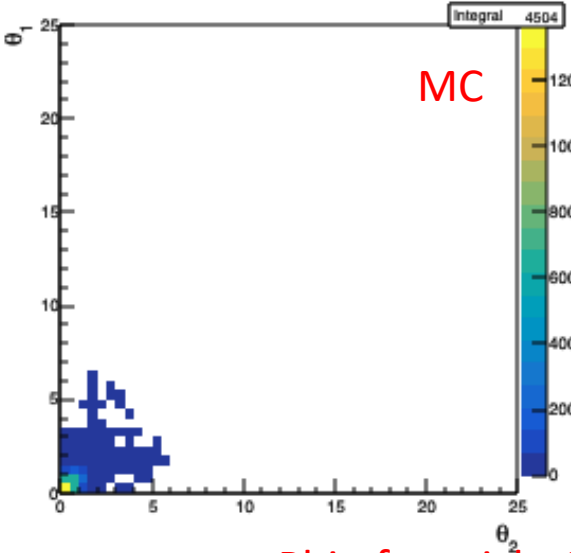
# BeAGLE 18x110 results – spectator protons – JPsi



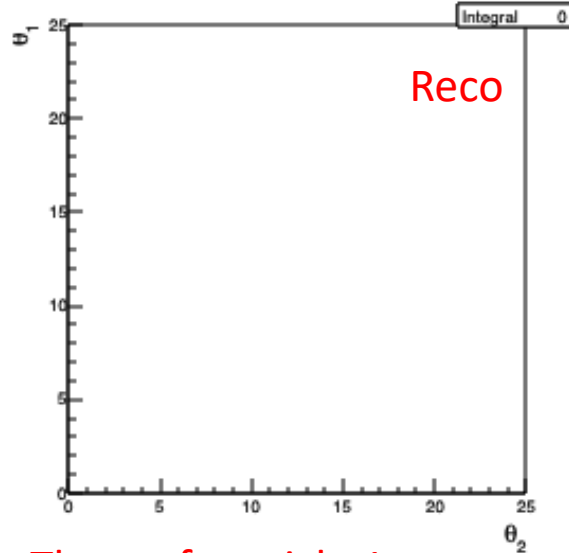
# BeAGLE 18x110 results – spectator protons – JPsi

Theta of particle 1 vs. Theta of particle 2

proton\_theta\_one\_vs\_theta\_two\_MC

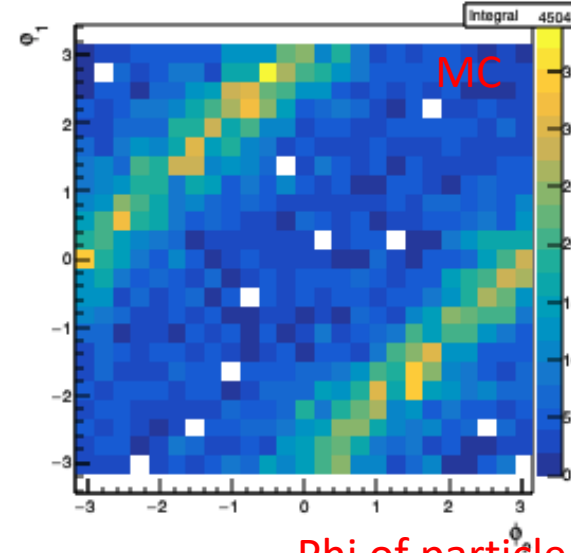


proton\_theta\_one\_vs\_theta\_two\_Reco

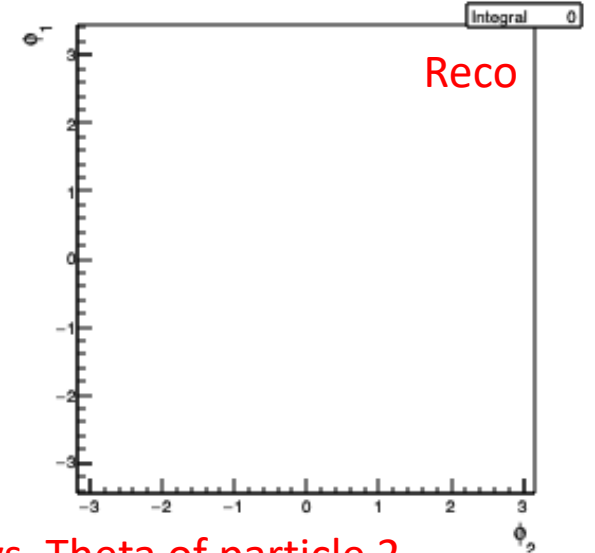


Phi of particle 1 vs. Phi of particle 2

proton\_phi\_one\_vs\_phi\_two\_MC

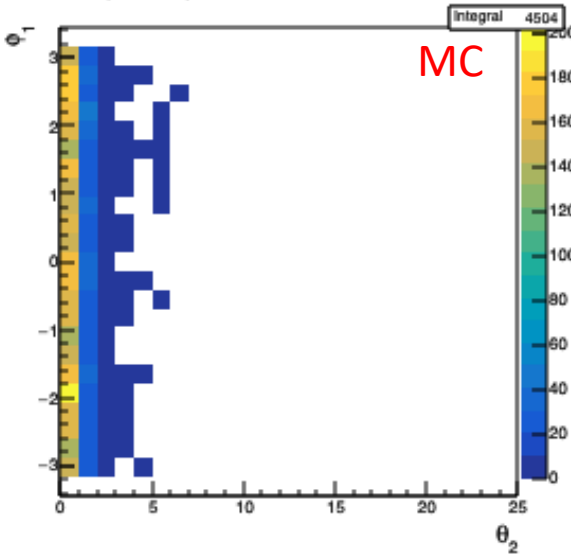


proton\_phi\_one\_vs\_phi\_two\_Reco

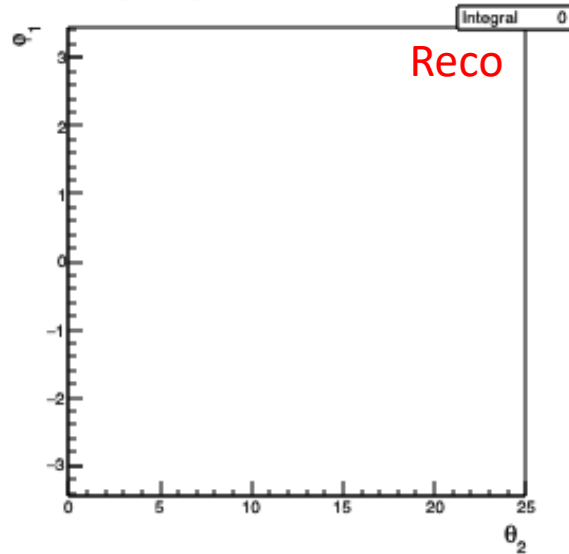


Phi of particle 1 vs. Theta of particle 1

proton\_phi\_one\_vs\_theta\_one\_MC

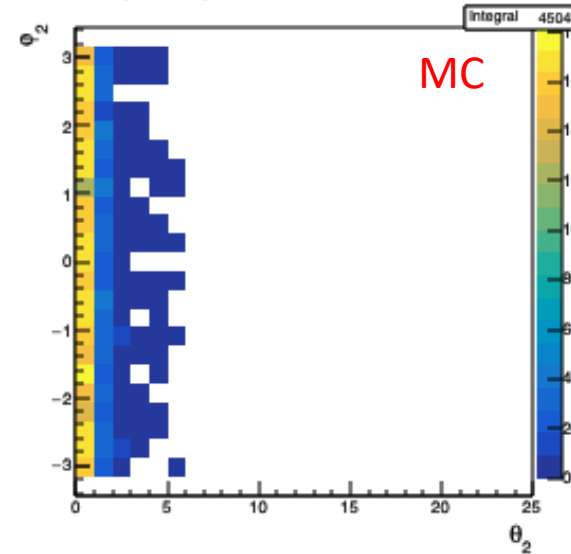


proton\_phi\_one\_vs\_theta\_one\_Reco

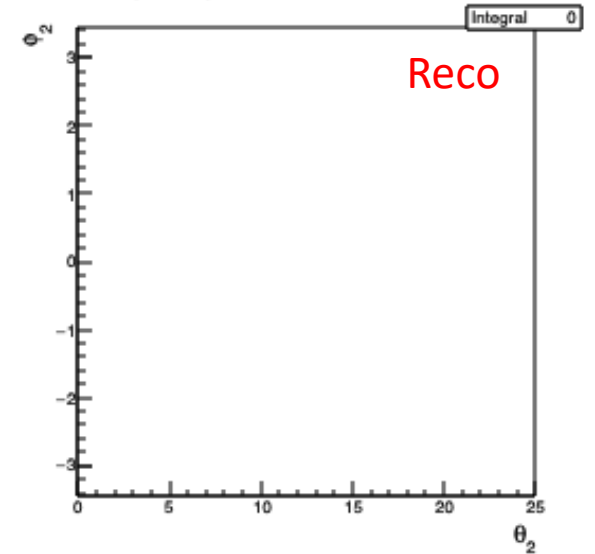


Phi of particle 2 vs. Theta of particle 2

proton\_phi\_two\_vs\_theta\_two\_MC

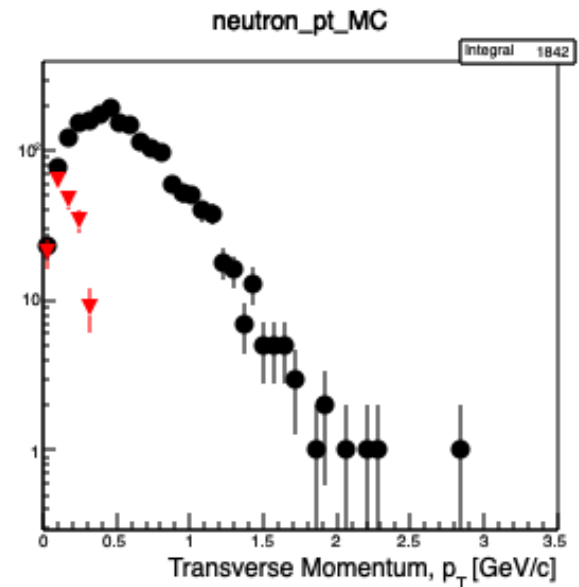
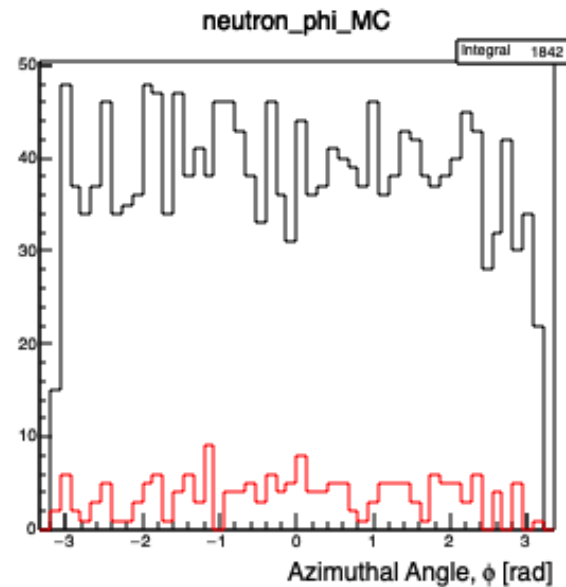
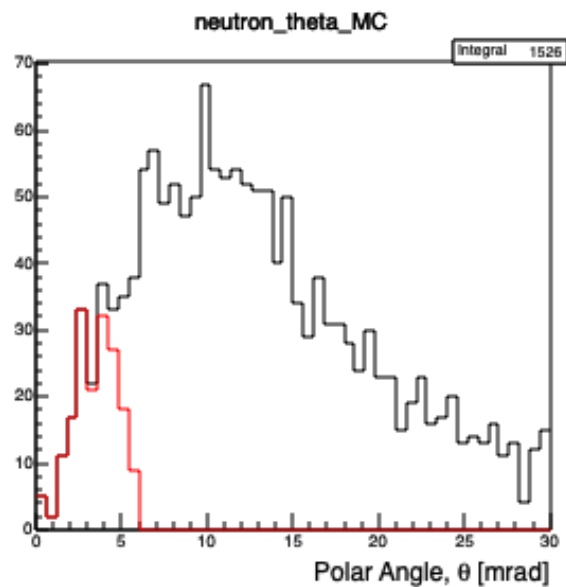
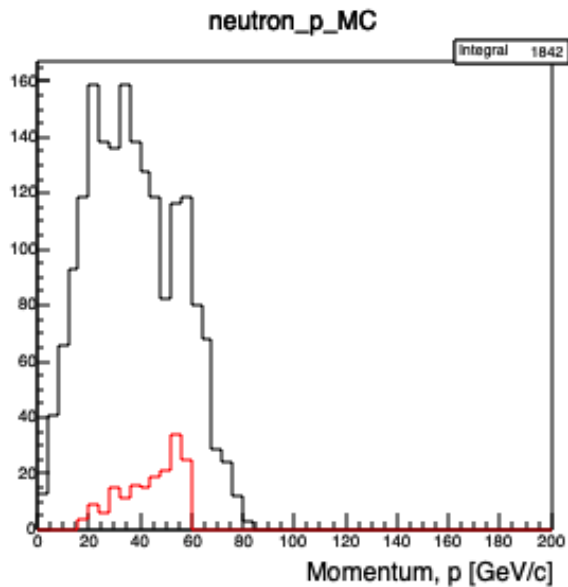
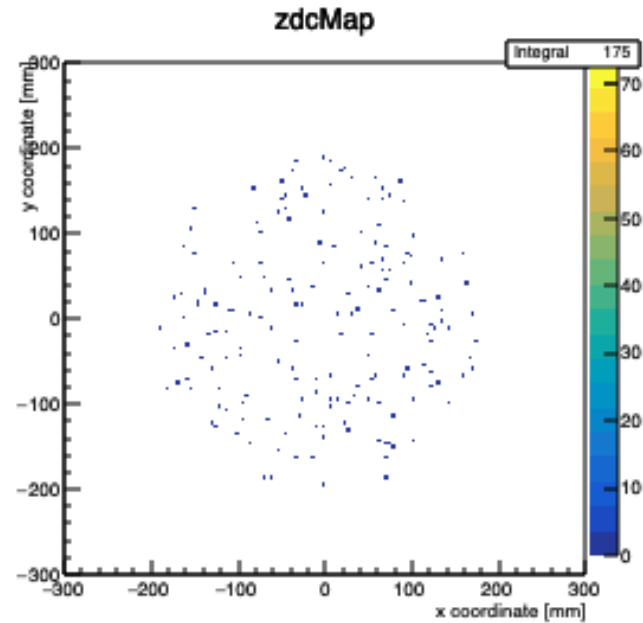


proton\_phi\_two\_vs\_theta\_two\_Reco

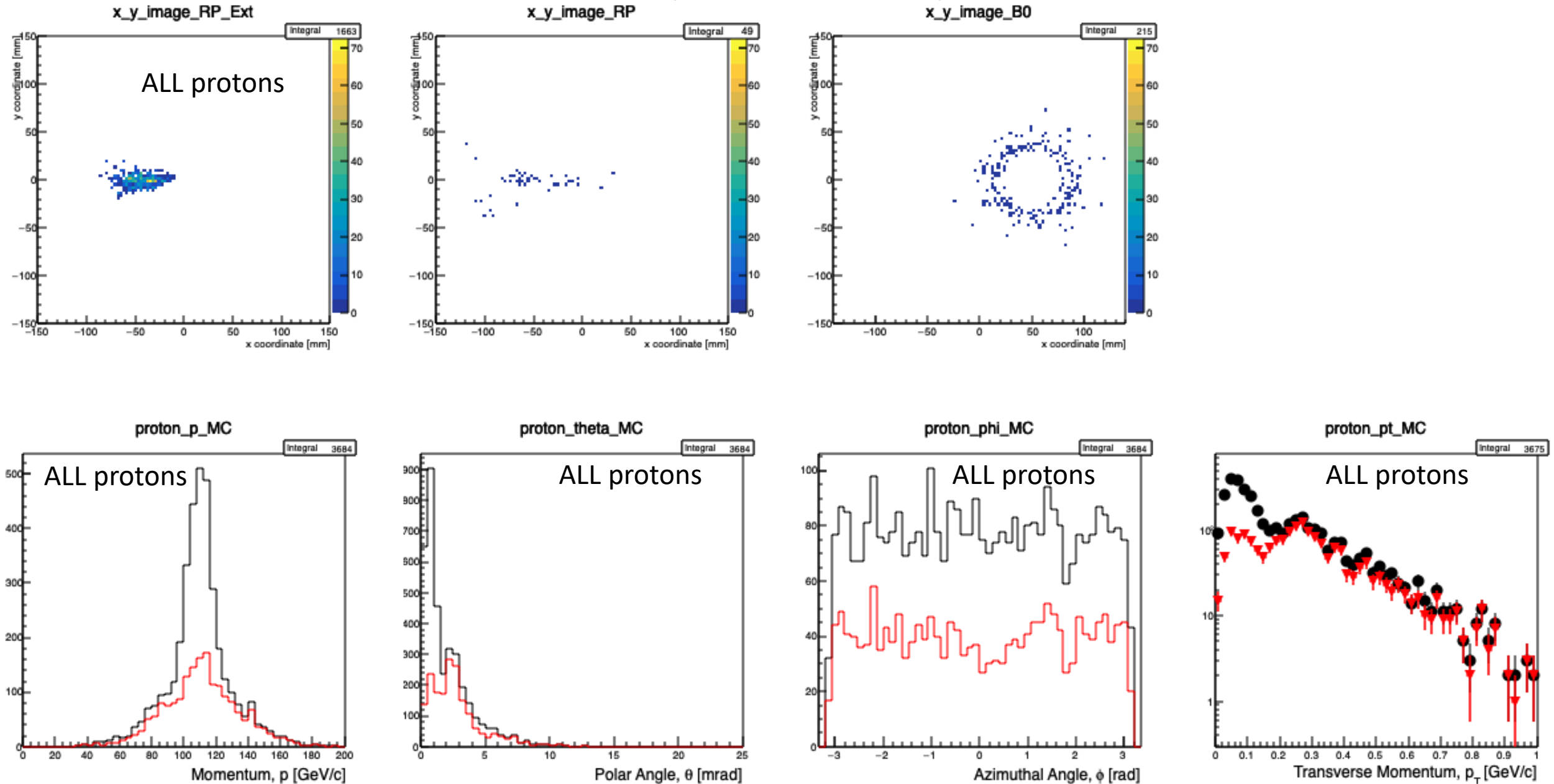


Ivica 18x110 GeV/n SRC

# Ivica 18x110 results – active neutrons – SRC

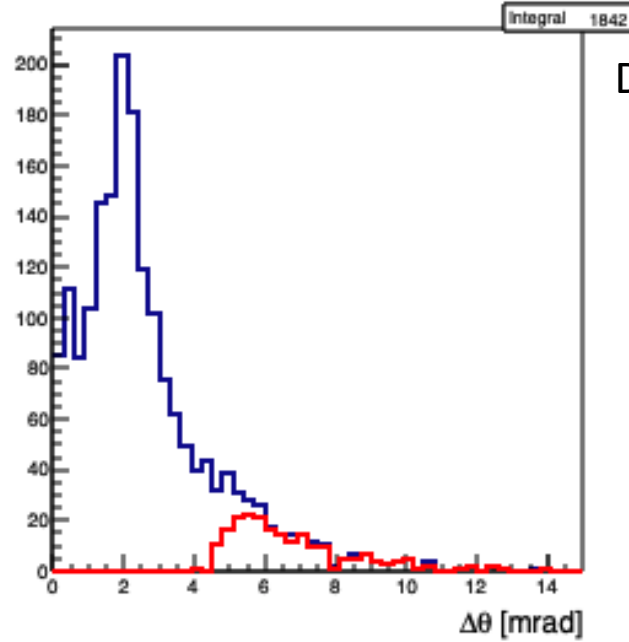


# Ivica 18x110 results – spectator protons – SRC

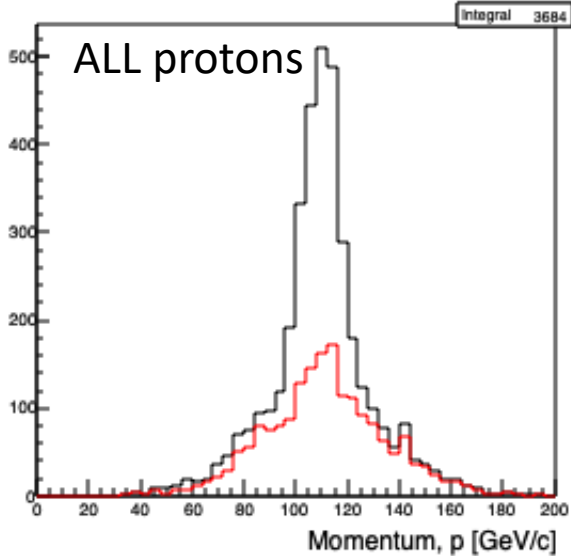


# Ivica 18x110 results – spectator protons – SRC

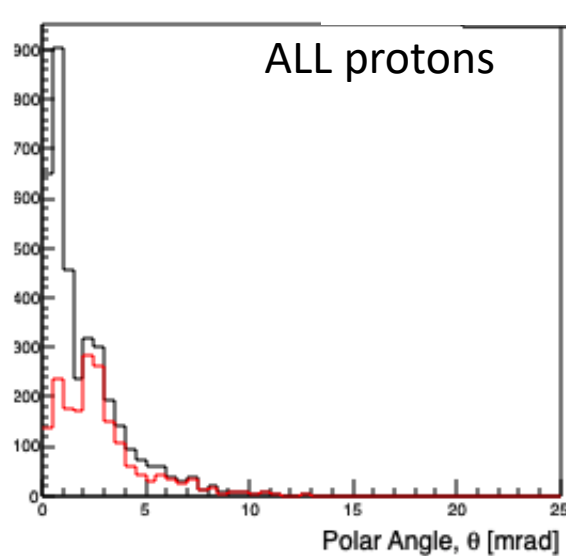
$\Delta\theta_{di\_protons\_MC}$



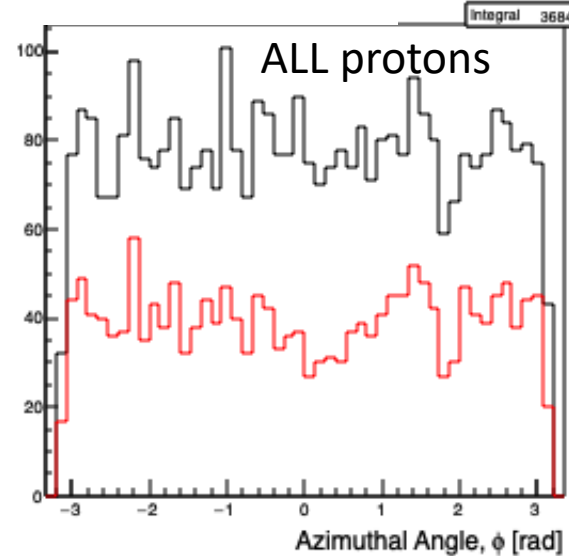
proton\_p\_MC



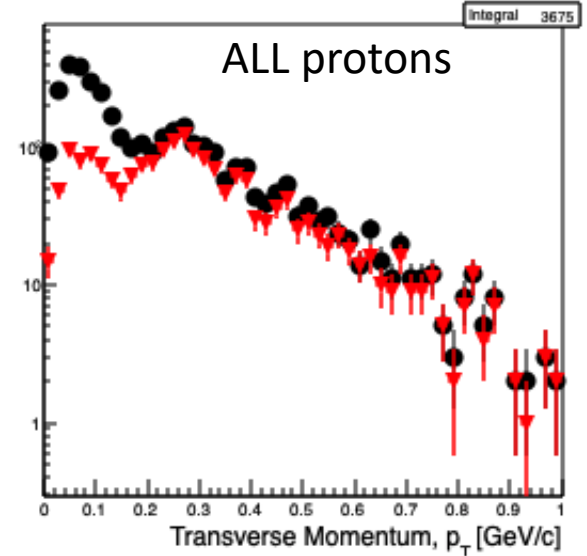
proton\_the



Integral 3684



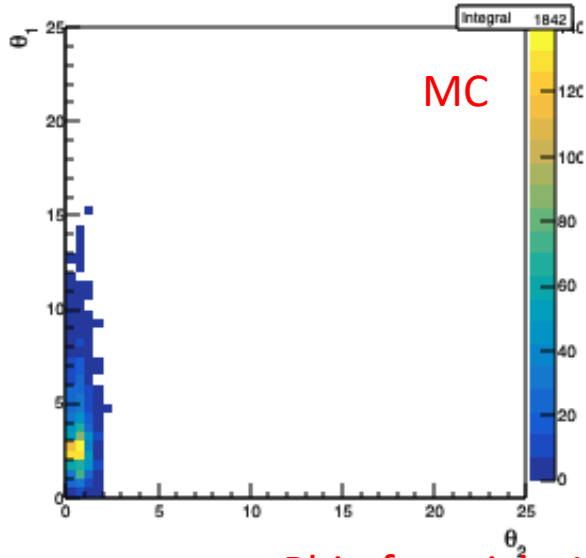
proton\_pt\_MC



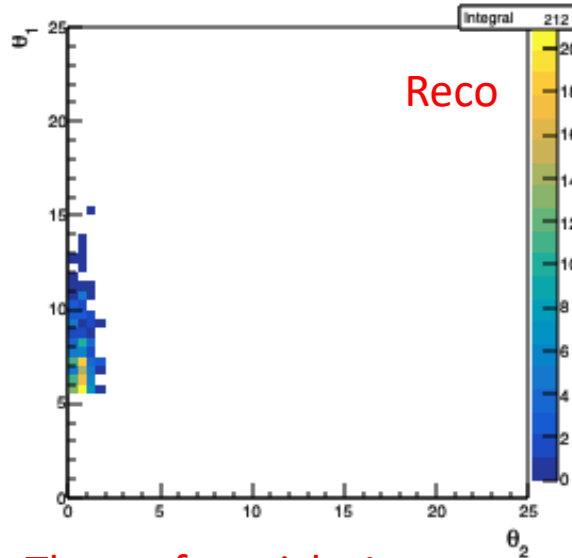
# Ivica 18x110 results – spectator protons – SRC

Theta of particle 1 vs. Theta of particle 2

proton\_theta\_one\_vs\_theta\_two\_MC

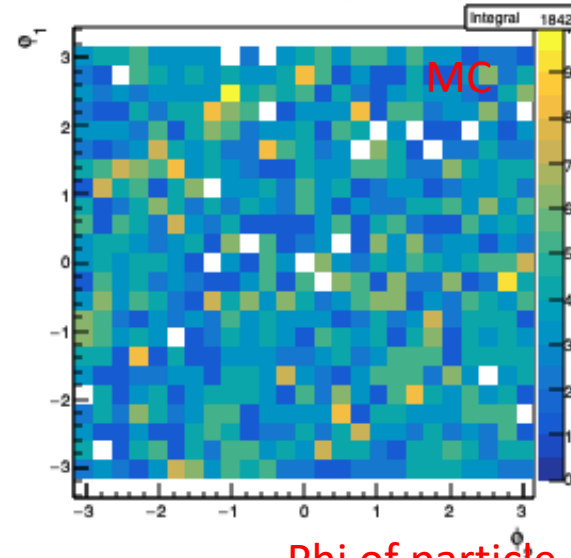


proton\_theta\_one\_vs\_theta\_two\_Reco

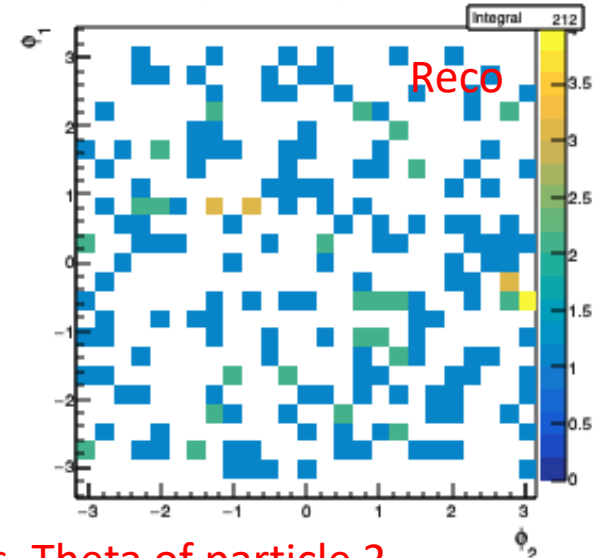


Phi of particle 1 vs. Phi of particle 2

proton\_phi\_one\_vs\_phi\_two\_MC

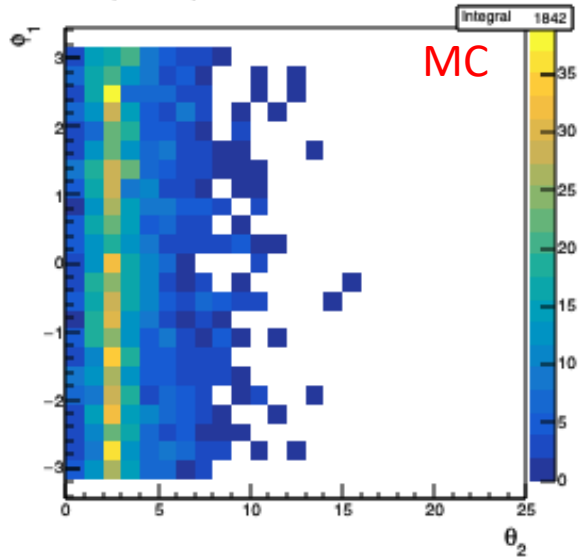


proton\_phi\_one\_vs\_phi\_two\_Reco

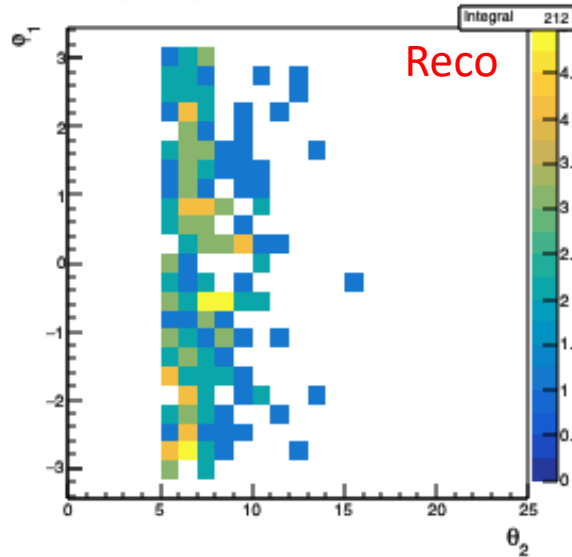


Phi of particle 1 vs. Theta of particle 1

proton\_phi\_one\_vs\_theta\_one\_MC

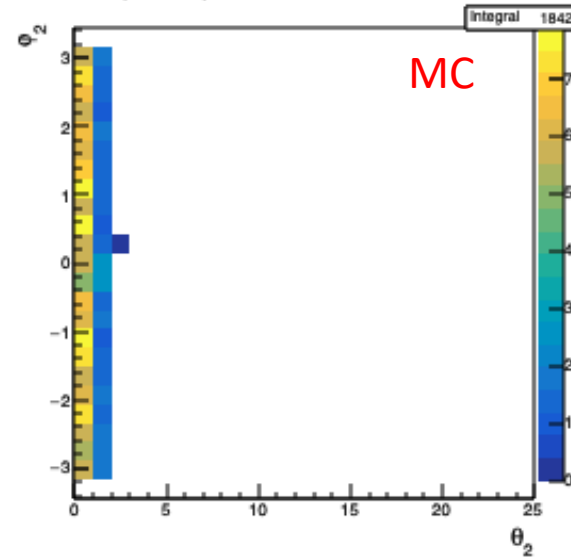


proton\_phi\_one\_vs\_theta\_one\_Reco

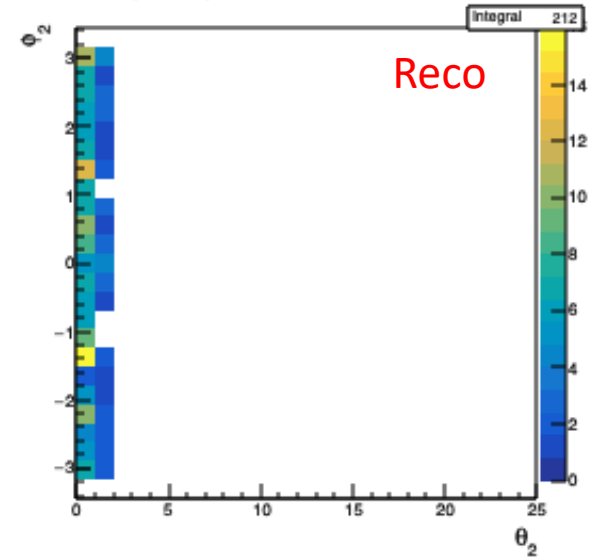


Phi of particle 2 vs. Theta of particle 2

proton\_phi\_two\_vs\_theta\_two\_MC



proton\_phi\_two\_vs\_theta\_two\_Reco





# Conclusions

- I think we should take some time to process the results before coming to any strong conclusions.
- More angular separation between the protons greatly improves the chance of double-tagging.